

# PATENT ABSTRACTS OF JAPAN

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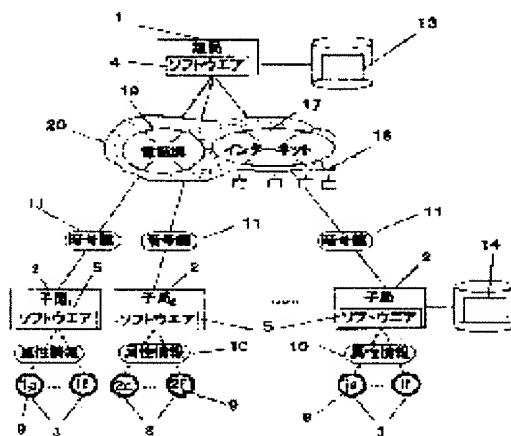
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## (54) METHOD OF EXCHANGING CIPHER INFORMATION

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To exchange information through an open information communication network by specifying a communication partner with security ensured.

**SOLUTION:** A primary station 1 generates a cryptographic key or a cryptographic key and an encipherment system 11 on a request from an application service or a user 3, and updates and manages the cryptographic key or the cryptographic key and encipherment system 11 corresponding to a user identification code 9 for the primary station cryptographic key management data 13 and distributes them to secondary stations 2. The secondary stations update and manage the cryptographic key or cryptographic key and encipherment system 11 distributed to secondary station cryptographic key management data 14 corresponding to the user identification code 9. The user 3 ciphers or deciphers the information by the cryptographic key or the cryptographic key and encipherment system 11 stored at the secondary station for transmitting and receiving the information, and uses the result of the executed application service.



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## CLAIMS

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[Claim(s)]

[Claim 1]It goes via WAN (20) containing the Internet (17), LAN (18), and a public telephone network (19), A child station (2) which carried out subscription connection, and user-attributes information (10) are directly registered through a child station (2) to a key station (1) to a key station (1), In a communications network which performs application service constituted from three persons of a user (3) to whom a user classification symbol (9) which a key station (1) generated was given, By a distribution request of application service, an encryption key from a user (3) or an encryption key, and a cipher system (11). A key station (1) generates or chooses a user (an encryption key of every 3) or encryption key, and cipher system (11), a child station (2) in which a user's (3)'s user classification symbol (9) is stored -- a plaintext -- or, [ encipher, distribute and ] Carry out updating management of the user (an encryption key of every 3) or encryption key, and cipher system (11) at key station code management data (13), and a child station (2) carries out updating management of the user (an encryption key of every 3) or encryption key, and cipher system (11) at child station code management data (14), Coding information exchange system which a user (3) uses an encryption key or an encryption key, and a cipher system (11) through a child station (2) or a key station (1), enciphers or decrypts information, and communicates information between other users (3) or a key station (1).

[Claim 2]In claim 1, when a child station (2) connects with a key station (1) first, A key station (1) generates a child station classification symbol (12), and to key station encryption key management data (13). It records that a user classification symbol (9) of a user (3) who uses through a child station classification symbol (12) can be referred to, Carry out storage management and a child station classification symbol (12) or an enciphered child station classification symbol (12) is distributed to a child station (2), A child station (2) stores a child station classification symbol (12) of a distributed local station in child station encryption key management data (14), When a user (3) registers to a key station (1), a user classification symbol (9) distributed to a child station (2) from a key station (1) is stored in child station encryption key management data (14), When a user (3) participates to application service through a child station (2) or a key station (1), A user (3) of a user classification symbol (9) which is not stored with child station encryption key management data (14) or key station encryption key management data (13) has intervention to application service refused, A user (3) of a user classification symbol (9) stored lets a child station (2) or a key station (1) pass, and transmits a user classification symbol (9), and user-attributes information (10) and a child station classification symbol (12) to a key station (1) together, Coding information exchange system for which a key station (1) checks that a user (3) has participated in application service through a child station (2) or a key station (1), and a user (3) is attested.

[Claim 3]Coding information exchange system which can participate to application service in claim 1 or claim 2 through another child station (2) in which the same user (3) stored a user classification symbol (9) when a user (3) has already registered with a key station (1) through a child station (2) or a key station (1) [Claim 4]In claim 3, a user (3) with whom registration was already able to be managed to a key station (1) performs procedure which uses application service through a child station (2) or a key station (1) where a user classification symbol (9) is

not stored, Let a child station (2) in which a user classification symbol (9) is already stored pass, and it applies for attestation to a key station (1), a key station (1) which attested a user (3) -- key station encryption key management data (13) -- a user classification symbol -- (-- a child station classification symbol (12) to every 9), [ and ] Carry out storage management and a user classification symbol (9) is distributed to a child station (2) in which a user classification symbol (9) is not stored, Coding information exchange system which attests a user (3) in whom a child station (2) stores a user classification symbol (9) in child station encryption key management data (14), and the user (3) can participate to application service through a new child station (2) or a key station (1).

[Claim 5]in claim 3 -- a child station (2) from a key station (1) -- a user -- (-- two or more encryption keys or encryption keys, and cipher systems (11) being distributed at once to every 3), and, Coding information exchange system which updates an encryption key or an encryption key, and a cipher system (11) of a key station (1) and a child station (2) for information (15) which holds two or more distributed encryption keys or encryption keys, and cipher systems (11) for the updating management of the key between a key station (1) and a child station (2) [Claim 6]Hierarchical coding information exchange system providing a key station (1) where K key stations (1) were connected as a child station (2) noting that only K key stations (1) which connected a child station (2) of  $N_k$  individual existed in claim 5 from a key station (1) which connected a child station (2) of  $N_i$  individual [Claim 7]In claim 6, a key station (1) enciphers a

new encryption key or an encryption key, and a cipher system (11) with an encryption key or an encryption key already distributed to a child station (2), and a cipher system (11), and distributes them to a child station (2), A child station (2) is an encryption key or an encryption key, and a cipher system (11) which have already been received, Coding information exchange system which carries out updating storing of an encryption key or an encryption key which decrypts an encryption key or an encryption key, and a cipher system (11) which were received, and which were enciphered, and is stored in child station encryption key management data (14) of a child station (2), and the cipher system (11).

[Claim 8]In claim 6, encipher without a new encryption key or an encryption key, an encryption key that already distributed a cipher system (11) to a child station (2) or an encryption key, and a cipher system (11), and a key station (1) is distributed to a child station (2), Coding information exchange system which a child station (2) decrypts this code and is stored in child station encryption key management data (14).

[Claim 9]In claim 7 or claim 8, encipher information addressed to the singular number or two or more users (3) which a user (3) of a transmitting agency wants to transmit, transmit to a key station (1), and a key station (1) decrypts a code, It enciphers with a transmission destination's encryption key or an encryption key, and a cipher system (11) of a user (3), Coding information exchange system which it transmits to a child station (2) in which a user classification symbol (9) of a transmission destination is stored, and a user (3) of a transmission destination decrypts a code, receives information from a user (3) of a transmitting agency, relays a key station (1) among transmission destinations a transmitting agency, and communicates coding information.

[Claim 10]Before communicating in claim 7 or claim 8 the singular number or two or more users (3), and directly a user (3) wants to communicate, A key station (1) distributes a user's (3)'s encryption key or an encryption key, and a cipher system (11) of a receiving agency to a child station (2) in which a user classification symbol (9) of a transmitting agency is stored, Coding information exchange system which a user (3) of a transmitting agency enciphers information with a distributed encryption key or an encryption key, and a cipher system (11), and transmits to a user (3) of a transmission destination directly, and a user (3) who received decrypts a code, and communicates information.

[Claim 11]In claim 7 or claim 8, by demand of application service or a user (3). A key station (1) generates or chooses an encryption key or an encryption key common to a limited user (3), a cipher system (11), or code confirmed information (23), Coding information exchange system which distributes to a child station (2) or a key station (1) where a user's (3)'s user classification symbol (9) was registered, and communicates coding information [Claim 12]Coding information

exchange system which communicates information enciphered between a user (3) and a key station (1) in claim 7 or claim 8.

[Claim 13]When information of two or more users (3) required for application service shifts in time and a message is received in a key station (1) in an information communication method of claim 9, claim 10, and claim 11, Coding information exchange system with which a key station (1) processes application service in connection with two or more users (3) after information required of application service receives a message altogether in a key station (1).

[Claim 14]In claim 12 and claim 13, application SOFUTOUE for child stations using a coding information switching function (5) is installed, Coding information exchange system which communicates coding information with other users (3) instead of a user (3) of a user classification symbol (9) with which a user (3) of a user classification symbol (9) stored in a child station (2) does not perform direct entry operation, but application service is stored in a child station (2).

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Objects of the Invention]As a communications network, it is expanding globally as LAN, the switching network of a public telephone network, and a communications network cheap [ the Internet ] and open. For people of Takeshi who participated in WAN containing the Internet and a telephone network, it is open, and in the contents of information, a third party gets \*\*\*\*\* easily as connection is easy. Therefore, the weak point of these communications networks is how to conquer the security of a communications network. An unexpected partner invades into a communication equipment as a problem of the security on a communications network, Out of how he is protected from the virus which destroys the problem and system which are referred to as how to prevent tapping and the destruction act of data or a system, and data, the problem referred to as how do intercept those information or to prevent the use which abused the character of the communications network where a communication partner is not seen is during data communication.

[0002]When performing the problem of attestation of how to check, and information encryption prevented from understanding the contents for information except the party concerned if a communication partner is a partner infallible to be sure in order to prevent the problem produced during communication, It is extracted to two points of the problem referred to as how to exchange safely the encryption key which enciphers information. It is related with how this invention exchanges an encryption key and a cipher system safely so that only how it checking if the partner who is communicating is a right partner, and authorized personnel can use it.

[0003]

[Field of the Invention]It is related with the coding information exchange system of how to perform safe information exchange with an electronic intelligence communications network.

[0004]

[Description of the Prior Art]Although safe information exchange with an information-and-telecommunications network is performed how or research is done for many years, along with the spread of the Internet, communication of safe information is becoming important in recent years. In order to secure the safety of the information which communicates with an information-and-telecommunications network, to encipher information, to transmit and to prevent from reading except authorized personnel, there is no proposal about the cipher system which enciphers information, and the method which attest the person himself/herself for an encryption key using the both sides of a public key and a secret key in order to send an encryption key safely, and enciphers and decrypts information -- \*\*\*\*\*. Performing attestation of the person himself/herself etc. is studied by the generating \*\*\*\* method in the password only for 1 time (16).

[0005]

[Problem(s) to be Solved by the Invention]The technical problem of the information communication in the high information-and-telecommunications network of open nature has the following technical problems to information exchange and the use in a commercial transaction etc.

1 2 [ Reservation of the attestation nature of the person himself/herself ] which requires the management man hour of encryption key distribution Release 3 from a risk of an individual memorizing an encryption key Reservation 4 of the security to tapping and decryption Reduction 5 of the risk of a settlement system in the delivery clearing time [0006]If an encryption key is mutually distributed among N persons, in a (drawing 4), the management man hour which distributes an encryption key in  $N(N-1)/2$  of courses will occur. decreasing this cost -- one -- a technical problem -- \*\*

[0007]The encryption key must be memorized in order to decode the enciphered information with an encryption key. In order to carry out as [ decode / a code / simply ], an encryption key becomes long, and the limit which human being memorizes is exceeded. If it becomes so, the password management for managing an encryption key will be needed, and the management corresponding to the limit of human being's mneme will be demanded after all. Although trials, such as separating a secret key from memory of human being, are also considered using an IC card, the problem at the time of losing a card of the security of the encryption key managed in an individual, etc. are not necessarily strong. Management of such an encryption key keeps away the opportunity which can use an information-and-telecommunications network freely.

[0008]It is [ how it prevents being decoded, even if communication with an information-and-telecommunications network is intercepted or it has enciphered, and ] a big technical problem. Damage will be enlarged, if theft is committed in the disguise of [ there is nothing, and the stolen information is used and ] the person himself/herself as information is stolen. It is [ how such damage is prevented and ] a central technical problem.

[0009]As compared with over-the-counter sales, it is one technical problem how goods and a price are settled on a communications network. After passing goods in exchange for a price when goods are delivered, or remitting a price previously, goods are sent or the after-delivery money is transferred for goods. At the commercial transaction on the information network accompanied by delivery of goods, if the relative settlement of accounts of a price and the goods cannot be carried out, the direction which paid goods or a price takes a risk. A negotiated transaction is desirable also to dealings with an information-and-telecommunications network.

[0010]The crime which fakes the person himself/herself, steals, and inflicts damage on the person himself/herself, steals others' information, or destroys others' soft property is a big problem on an information-and-telecommunications network. It is [ how it is attested whether a communicative partner is the person himself/herself and ] the biggest technical problem.

[0011]

[Means for Solving the Problem]Since a key station generates a disposable encryption key [Throw Away Encryptical key] or a disposable encryption key, and a cipher system and distributes a concept of this invention to a child station if needed, Since [ the ] a user's encryption key or an encryption key, and a cipher system change, Since a disposable encryption key or a disposable encryption key, and a cipher system are changing even if it is going to intercept, and a code must be decoded, a certain time passes and it succeeds in a decipherment of a code, Since it differs from an encryption key or an encryption key which a key station distributed, and a cipher system even if it tries to become a user completely, a key station cannot decrypt a code of a charlatan who is trying to become a user completely, and it does not attest with the person himself/herself.

[0012]Application software for key stations using a coding information switching function (4) is installed by drawing 1 and drawing 2, Have an assignment function (6) of a key station of a coding information switching function, and it goes via the Internet (17), LAN (18), and WAN (20) containing a public telephone network (19), A key station (1) which comprises information machines and equipment which perform communication of a child station (2) and coding information which carried out subscription connection to a key station (1), such as a personal computer or a workstation, Application software (5) for child stations using a coding information switching function incorporating an assignment function (8) of a child station of a coding information switching function is installed, A child station (2) which comprises information machines and equipment which carried out subscription connection to a key station (1), such as a personal computer, a movement information terminal, or a workstation, A user (3) who had an

assignment function (8) of a user (3) of a coding information switching function, and was registered into a key station (1), Or a coding information exchange communications network which comprises a user (3) who united with a child station (2) which substitutes for a user's (3)'s function application software (5) installed in a child station (2) is constituted.

[0013]What communication of an encryption key or an encryption key, and a cipher system (11) is performed only between a key station (1) and a child station (2), and makes a direct change of an encryption key or an encryption key, and the cipher system (11) between child stations (2) is not done. Therefore, since a key station (1) unified and an encryption key or an encryption key, and a cipher system (11) which were enciphered are managed, Even if load about management of an encryption key does not hang but it intercepts coding information between child stations (2) in the middle of transmitting, unless a code will be decoded, the third party cannot know an encryption key or an encryption key, and a cipher system (11), but can distribute them safely.

[0014]An assignment function about coding information exchange of a key station (1), a child station (2), and a user (3) is drawing 2, An assignment function (6) of a key station of a coding information switching function Issue requesting of an encryption key from 1. user (3) or an encryption key, and a cipher system (11), every [ or ] issue requesting when an event occurs in application service, or set-up random or fixed number of times -- or, receiving issue requesting for every time set as a random or fixed interval -- a key station (1) -- a user -- (--- the singular number, or two or more encryption keys or encryption keys and cipher systems (11) are generated or chosen as every 3).

2. Update a user classification symbol (an encryption key or an encryption key generated or chosen as every 9), and cipher system (11) to key station encryption key management data (13).

3. Distribute an encryption key or an encryption key, and a cipher system (11) which were generated or chosen to a child station (2) in which a user's (3)'s user classification symbol (9) is stored.

4. At the time of a user's (3)'s registration, generate a user classification symbol (9) and it records on key station encryption key management data (13), Attach a user classification symbol (9) and correspondence and user-attributes information (10) is recorded, A user classification symbol (9) is distributed to a child station (2) which a user (3) connected to a key station (1) through a child station (2), At the time of subscription connection of 5. child station (2) which connects to a user that a key station (1) accepted registration, a child station classification symbol (12) is generated, and it records on key station encryption key management data (13), and distributes to a child station (2).

6. A user classification symbol (9), user-attributes information (10), and a child station classification symbol (12) which perform an input receptionist of a child station (2) and application service using communications control 7. coding information exchange system with a child station (2) and of which function 8. encryption was done are received, It compares with key station encryption key management data (13), and a user (3) is attested.

9. Encipher and composite-ize information on the occasion of information communication with a child station (2).

[0014]a user (3) in whom an assignment functional function (7) of a child station of a coding information switching function corresponding to this stores a communications control 2. user classification symbol (9) with 1. key station (1) -- each time -- an encryption key or an encryption key, and a cipher system (11) -- a user classification symbol -- (--- it updates and stores in every 9).

3. A key station (1) stores a child station classification symbol (12) distributed to a child station (2), and transmits user-attributes information (10) for a child station classification symbol (12) to a key station (1) together with a user classification symbol (9).

4. A child station (2) checks the singular number or two or more user classification symbols (9) which are stored in child station encryption key management data (14), and refuses intervention to application service of a user (3) by whom a user classification symbol (9) is not stored.

5. a part or all of user-attributes information (10) that a child station (2) has registered -- a user (3) -- the person himself/herself -- it stores in a child station (2) so that a third party of an except cannot see, and time and effort as which a user (3) inputs attribution information by hand

can also be omitted.

6. Receive a change request of a password (16) from a user (3), transmit update information to a key station (1), and when a child station (2) stores inside, perform change processing of stored data.

7. When a user (3) performs other child stations (2) or key stations (1), and information communications through a child station (2), encipher and composite-size information using a stored user (an encryption key of every 3) or encryption key, and cipher system (11).

[0015] Finally an assignment function (8) of a user of a coding information switching function inputs attribution information (10) as a user (3) demanded by application service through 1. child station (2) or a key station (1). It transmits, procedure demanded by application service is performed, and it registers with a key station (1) as a user (3).

2. It lets a child station (2) or a key station (1) pass, perform application service, and deal in convenience.

3. Although a user (3) inputs a part of user-attributes information (10) or all the information through a child station (2), a part or all of attribution information is stored in a child station (2), and operativity can be relieved.

4. Depending on application service, application software for child stations using a coding information switching function (5) is installed in a child station (2). Altogether, most input output functions are executed by proxy instead of a user (3), and execution of application service of a child station (2) is attained nothing by a user's (3)'s input/output operation. Since a near user (3) who generally provides application service is united with a child station (2), application software for child stations using a coding information switching function (5) executes most a user's (3)'s functions by proxy altogether.

5. Change a password (16) managed by a user's (3)'s memory at any time.

[0016] In order that a user (3) may register with a key station (1) and may get attestation of being the person himself/herself, it arranges by the following three classifications as user-attributes information (10) transmitted and received between a child station (2) and a key station (1).

1 Information a which a key station (1) generates and is managed User classification symbol (9)  
b Child station classification symbol (12)

2 Information a managed by a user's (3)'s memory Password (16)

3 A user's (3)'s social information a Name b Address c Subscriber phone number

d e-mail address e g, such as a reference number described on documents which check the person himself/herself published by the public, such as a license, an insurance card, an extract of a family register, and a certified seal registration, information which an office key station (1) generates and is managed, Since a classification symbol (12) of a child station is used for information a child station (2) and a user (3) do [ information ] generation management in a key station (1) at the time of subscription connection or registration in a key station (1) in order that a key station (1) may identify a child station (2), a sign original with each of a child station (2) is assigned. A key station (1) manages a child station classification symbol (12), distributes to a child station (2), and is keeping a child station classification symbol (12) with key station encryption key management data (13) and child station encryption key management data (14). A user (3) is told about a user classification symbol (9), and storage management is carried out by key station (1) and a child station (2), and it is used instead of a name. There is a password (16) as information managed by a user's (3)'s memory. In principle, in advance of use of application service, a user (3) inputs this information by hand through a child station (2), and uses it as information for a user's (3)'s attestation of a key station (1). Although a password (16) is held by only a user's (3)'s memory in principle, since availability is raised, it is also possible to store so that a third party may hear into a child station (2) and it may not be found. In order that a password (16) may prevent disclosure to a third party, a user (password (16) of every 3) who performed change procedure by a child station (2), and has managed by key station (1) or a child station (2) is changed at any time. There are a name, an address, etc. as a user's (3)'s social information. These information is information which registers a user's (3)'s check previously when a user (3) registers with a key station (1) at first, At a given degree of use, in detail, since



time and effort is required, some of these information or all can be registered into a child station (2), and that a user (3) inputs this information by hand can also use them. however -- since it is not the information positively disclosed for a third party -- a user (3) -- the person himself/herself -- a person of an except cannot access -- it makes and stores.

[0017]When it generates or chooses, and an encryption key or an encryption key, generation of a cipher system (11), distribution, and a management key station (1) distribute an encryption key or an encryption key, and a cipher system (11), and update [ when ] them changes with application services. An encryption key or an encryption key, and a cipher system (11) where an information command about generation of a key, distribution, and updating communicated between a key station (1) and a child station (2) fundamentally and which were mutually in agreement between a key station (1) and a child station (2) are recorded and stored. There is the following command as an information command which manages a key.

1. A command is published when a generation distribution request of an updating report key of an updating notification 5. key of an update request 4. key of generation of a key and a reception report 3. key of a distribution-request 2. key is required from application service of a user (3) or a key station (1). Updating notification of a key distributes two or more encryption keys or encryption keys, and cipher systems (11) to a child station (2) at once by the required top of simplicity of management, and management, and drawing 3, For information (15) which manages a key which is common recognition between a key station (1) and child stations (2) after performing specific using frequency, a specific time interval, specific time, or specific application service. A result by which a child station (2) changed an encryption key or an encryption key, and a cipher system (11) is reported. In this case, when a key station (1) and a child station (2) are in a state which can always perform common status tracking, a key station (1) can update information on a key as well as a child station (2) changing a key. However, when a key station (1) cannot grasp a situation until it receives notification of a child station (2), the child station (2) must suspend use until updating is completed. For example, when updating to an encryption key or an encryption key, and a cipher system (11) of throwing away and the next for every using frequency which set up an encryption key or an encryption key used now, and a cipher system (11), a child station (2) between a key station (1) and a child station (2), Even if a common concept about using frequency is checked, it is used by a child station (2) how many times, and if it is not the Takako office (2), when it cannot do, grasp of a situation will be judged by a child station (2), will update an encryption key or an encryption key, and a cipher system (11), and will publish updating notification of a key to a key station (1).

[0018]Either of the cipher systems of a common key system already studied in the world is used for a cipher system used by this invention, and an encryption key. What kind of cipher system is chosen chooses according to the characteristic or business potential of application service.

[0019]Although distribution paths in case, as for a distribution path of an encryption key or an encryption key, and a cipher system (11), a child station (2) distributes a key mutually by (drawing 4 (a)) in an information-and-telecommunications network with a participant in N person in this invention are  $N*(N-1)/2$ , A key distribution path only between a key station (1) and a child station (2) is set to N by (drawing 4 (b)), and the distribution path of an encryption key can decrease only  $/(N-1)^2$  twice as compared with supplying arbitrary partners widely. If coding information exchange network with a layered structure which considers that K key stations (1) are child stations (2) by (drawing 4 (c)), provides a new key station (1), and makes an old key station (1) manage as a child station (2) is set up, Sepang of management decreases in number to N and K, and an encryption key or an encryption key, a distribution path of a cipher system (11), and a management man hour of distribution are simplified substantially.

[0020]When registration of a child station (2) and a user's (3)'s registration key station (1) receive a user's (3)'s registration, a check of a user (3) being the person himself/herself is very important. Here, it is shown by a diagram (5) between a key station (1), a child station (2), and a user (3) of what kind of information communication is performed and in what kind of order information is recorded again.

1. A key station (1) receives a download request of an application program from a child station (2) first. The key station (1) can record IP Address of a management number of a program, an

encryption key or an encryption key, a cipher system (11), and a child station (2) to download as confirmed information at the time of a date of acceptance. Although IPAddress of the Internet generally does not support a child station (2) 1 to 1, it expects and records that a value of a certain bandwidth is shown, or it moves continuously, are the fixed value, or a certain characteristic is shown.

2. A downloaded program (5) is installed in a child station (2), and a management number peculiar to a program, an encryption key or an encryption key, and a cipher system (11) are set as a child station (2).

3. A user (3) inputs user-attributes information (10) specified by a key station through a child station (2), and transmits to a key station (1) with a management number of a child station (2).

4. A key station (1) checks an encryption key or an encryption key, and a cipher system (11) with a management number, newly records time of registration, and user-attributes information (10), and generates and records a child station classification symbol (12), a user classification symbol (9), and an initial password (16).

5. Encipher a child station classification symbol (12), a user classification symbol (9), and an initial password (16), and transmit to a child station (2).

6. A child station (2) decrypts an enciphered child station classification symbol (12), a user classification symbol (9), and an initial password (16), and updates and stores them in a child station (2).

7. A user (3) checks a user classification symbol (9) and an initial password (16).

8. A user (3) performs change procedure of a password (16) through a child station (2), and a key station (1) receives change and breaks record.

9. A user (3) inputs user-attributes information (10) containing a user classification symbol (9) and a password (16) through a child station (2), and transmits a child station (2) to a key station (1) with an account of discernment of a child station (12).

10. A key station (1) records user-attributes information (10) and a child station classification symbol (12) containing a password (16) corresponding to a user's classification symbol (9).

11. It is difficult to check that he is the person himself/herself only for information through a communications network, it asks for sending of documents specified by applications, such as a license, a health insurance card, an extract of a family register, etc. which show a user's social information, or its copy, performs a check with already transmitted information, and keeps documents. A user (3) is registered now into a key station (1) via a child station (2).

12. A key station (1) publishes a card which specifies an address which shows the feature of a user classification symbol (9) and a key station (1), a telephone number, URL, a logo mark, etc. This card serves as connection at the time of a trouble, prevention in a case of faking a key station (1) and influencing, and advertisement of a key station (1) to a user (3).

[0021]Do not restrict that a downloaded program is used by one child station (2), but although a possibility of it being copied and being used by two or more child stations (2) is high, even if used by two or more child stations (2), An encryption key or an encryption key, and a cipher system (11) are changed at the time of a user's (3)'s registration, and it does not become a problem. Even if two or more users (3) register by one child station (2), an encryption key or an encryption key corresponding to two or more user classification symbols (9) and user classification symbols (9), and a cipher system (11) are set as a key station (1) and a child station (2). Therefore, two or more users (3) can use service of application through one child station (2).

[0022]When a user (3) uses service via two or more child stations (2). A user (3) not only uses service via one child station (2), but it lets a child station (2) of mho BAIRU, and a child station (2) at somewhere else pass, Although there is also a method which a user (3) who registered performs in response to presentation of social information which proves the person himself/herself like the first registration for whether you are the person himself/herself to use service, it is troublesome for a user (3). A registration act on a communications network which cancels this inconvenience is shown in drawing 6.

\*\* Already let the child station (2) A pass, and the user (3) a who has registered with a key station (1) goes via the child station (2) B, The user's a attribution information (10) which

application service containing a user classification symbol (9) and a password (16) requires is inputted, and two or more application-for-registration procedure is performed to a key station (1).

\*\* A key station (1) receives this procedure, and compare that a child station identification number (12) came via child station (2) B, and that the user (3) a has done the registry request with registered information, check them, and it already records them.

\*\* The user (3) a performs authentication via already registered child station (2) A.

\*\* A key station (1) checks an authentication request which the user (3) a received from the child station (2) A, and attests the person himself/herself.

\*\* A key station (1) distributes an encryption key or an encryption key, and a cipher system (11) which the user (3) a generated newly to the child station (2) B, and updates key station code management data (13).

\*\* The child station (2) B creates record which carried out the user's (3)'s a user classification symbol (9) correspondence with a distributed encryption key or an encryption key, and a cipher system (11). After this procedure ends, the user (3) a can use service of application via child station (2) A or the child station (2) B. Here, although explained that the child station (2) B was already ending with connection as a child station, when subscription connection of the child station (2) B is not yet carried out, if subscription connection procedure of a child station (2) is performed, it will become the same treatment as a case where it already connects.

[0023]A system of a re-registration method child station (2) when a system breaks may break. Although a key station (1) receives a user classification symbol (9), and a password (16) and user-attributes information (10) and there is also a method consider that is the person himself/herself, re-registration in this case, When all the user-attributes information (10) containing a user classification symbol (9) and a password (16) is stolen, subscription connection can be carried out to a key station (1) through another child station (2), and the person himself/herself can be become completely. Therefore, social information will be sent to a key station (1) in written form etc., and a check of the person himself/herself will be redone. When some systems destroy application service in the middle of execution, execution of application service will be canceled, it will be coped with by another means, such as a document, or a system will be restored, registration will be redone from the beginning, and application service will be performed.

[0024]Though a key station (1) has managed a user's encryption key or an encryption key, and a cipher system (11), It is necessary to clarify a relation of how to have a user's encryption key or an encryption key recorded on a child station (2), a cipher system (11) and an encryption key of a user recorded on a key station (1) or an encryption key, and a cipher system (11).

[0025]A dependency between a user's encryption key or an encryption key currently recorded in a key station (1), a cipher system (11) and an encryption key currently recorded by a child station (2) or an encryption key, and a cipher system (11) is shown in tucking-up-its-sleeves-with-a-cord distribution drawing 7. If a user's (3)'s encryption key or an encryption key, and a cipher system (11) which were already stored in a child station (2) are made into encryption key  $k_{-1}$  and cipher system  $k_{-1}$ , A key station (1) an encryption key or an encryption key distributed to a child station (2), and a cipher system (11) newly, It enciphers by encryption key  $k_{-1}$  and cipher system  $k_{-1}$  which were already stored in a child station (2), and transmits to a child station (2), and a child station (2) decrypts it and updates it to encryption key  $k$  and cipher system  $k$ . After this, information transmitted and received through a child station (2) is enciphered and double-sign-ized by encryption key  $k$  and cipher system  $k$  until it receives distribution of a new key. When coding information is received simultaneously with an encryption key or an encryption key, and a cipher system (11), the code is decrypted by encryption key  $k_{-1}$  and cipher system  $k_{-1}$  which have already been registered. Thus, since encryption and decryption are performed using transmitted an encryption key or an encryption key, and a cipher system (11) already, it becomes an encryption key of tucking up its sleeves with a cord or an encryption

key, and a usage pattern of a cipher system (11). Between a key station (1) and a child station (2), a time gap arises in distribution of a key and communication of coding information, and a relation which can be used for tucking up its sleeves with a cord of an encryption key or an encryption key, and a cipher system (11) is advantageously committed on security reservation to them.

[0026]An encryption key or an encryption key, and a cipher system (11) which a key station (1) enciphered to parallel distribution system drawing 8 of an encryption key are distributed to a child station (2), a distributed code is decrypted in a child station (2), and an encryption key or an encryption key, and a cipher system (11) are stored in a child station (2). Information is enciphered and decrypted in front with a distributed encryption key or an encryption key, an encryption key distributed without a cipher system (11) or an encryption key, and a cipher system (11).

[0027]A method of information exchange using coding information exchange system which comprises a key station (1), a child station (2), and a user (3) sets up the following three forms.

- 1 A key station (1) relays a user's (3)'s information, and exchanges information.
- 2 Exchange information directly among users (3).
- 3 Exchange information between a key station (1) and a user (3).

After checking that he is a user (3), information to update may perform a case where encipher a plaintext and information is communicated, and \*\*\*\*\* of a plaintext. In order that exchange of information generated on management, such as information exchange at the time of a trouble, may support execution of application service as information communication, it generates besides information exchange made into the purpose, but only information exchange performed when a user (3) uses application service here is explained.

[0028]Relay-information exchange: A case where a key station (1) conveys information to drawing 9 between the child station (2) A and the child station (2) B, and relay communication of information is performed among the child stations (2) A and B is shown. An address of a user (3) of delivery information enciphered with the user's (3)'s a an encryption key or an encryption key, and a cipher system (11) and a transmission destination is transmitted to a key station (1). A received key station (1) decrypts a code, enciphers delivery information with the child station's (2)'s B an encryption key or an encryption key, and a cipher system (11) of the user (3) b, and transmits to child station (2) B into which the user (3) b is registered. The user (3) b who received by the child station (2) B decrypts information, and understands the contents of receipt information. Information is not directly transmitted and received between the child station (2) A and child station (2) B, but a key station (1) is relayed, and information is communicated indirectly.

[0029]In order to perform groove preparation during interruption of welding of encryption of information, and decryption in a key station (1) in relay information exchange, time and effort is required, but [ therefore ] there is also an advantage acquired.

1 For indirect information dealings, stop the user's (3)'s a user-attributes information (10) for checking in a key station (1), and it is giving the user (3) b only information about business, and anonymous signal transduction of it becomes possible.

2 Timing to which a key station (1) receives information of the user (3) a of drawing 10 when a key station (1) performs relay information exchange between the child stations (2) A and B, When timing which receives the user's (3)'s b information is not in agreement, processing of application service is suspended temporarily, and after both information gathers, processing of application service is performed.

[0030]When communicating information directly among users (3) : The user (3) a through the child station (2) A by drawing 11 to communicate coding information between child stations (2) directly without passing a key station (1) A direct communication request with the user (3) b, A distribution request of code confirmed information for a check (23) replaced with an encryption key or an encryption key, a cipher system (11), or it is carried out. A key station (1) generates or chooses code confirmed information (23) replaced with an encryption key of the user (3) a and user (3) b community or an encryption key, a cipher system (11), or it, and distributes it to child station (2) A and the child station (2) B. Code confirmed information (23) replaced with an

encryption key or an encryption key, a cipher system (11), or it which was double-sign-ized by both child stations (2) is stored, coding information is transmitted, received and decrypted among the users (3) a and b, the contents are checked, and information is communicated.

[0031]When transmission and reception of coding information are performed between transmitting [ information ] origin and a receiving agency by a user (3), From a person for transmitting principal and interest (3), to the singular number or two or more transmission destination users (3), it is made by distribution request of an encryption key or an encryption key, and a cipher system (11) to a key station (1), and to it a key station (1), Transmit a transmission destination's encryption key or an encryption key, and a cipher system (11) of a user (3) to a child station (2) in which a user classification symbol (9) of a user (3) of a transmitting agency is stored, and a classification symbol (9) of a user of a transmitting agency enciphers information, It transmits to a transmission destination, a user (3) of a transmission destination composite-izes a code, and information communication is made.

[0032]: which communicates information between a key station (1) and a user (3) -- a user (3) may communicate information between direct key stations (1) through a child station (2). A1 of a user (3) lets the child station (2) A pass by drawing 12, and communication of a key station (1) and direct information is performed.

[0033]

[Example]

The example of the article transaction trading system which delivers goods via a communications network is shown in delivery dealings drawing 13. A key station (1) conveys the order from a purchaser to a vender, and if it agrees on dealing, it will settle dealings. The purchaser of a child station (2) orders the goods to purchase, and the vender of a child station (2) ships goods to an address directly in response to an order. The vender who registered with two or more child stations with the purchaser who registered with two or more child stations which carried out subscription connection to dealings commission / settlement-of-accounts organization of the key station (1) constitutes a commercial transaction communications network. It hits an example in case a key station (1) relays a user's (3)'s information and exchanges information. If the procedure of dealings is followed by drawing 13, \*\* purchaser's transaction start request will be transmitted to relay commission / settlement-of-accounts organization together with a user classification symbol (9), user-attributes information (10), and a child station classification symbol (12), and relay commission / settlement-of-accounts organization will decrypt this. A purchaser is checked with a user classification symbol (9), user-attributes information (10), and a child station classification symbol (12).

\*\* Relay commission / settlement-of-accounts organization generates the encryption key or encryption key, and cipher system (11) of a transaction number and a purchaser, and distributes them to a purchaser. As for the purchaser who received, an encryption key or an encryption key, and a cipher system (11) are updated by a child station (2).

\*\* A purchaser enciphers URL (Universal Resource Locator) of a vender's child station (2), merchandise information to purchase, and a purchaser's attribution information, and transmits to relay commission / settlement-of-accounts organization. Relay commission / settlement-of-accounts organization decrypts a code, attests a purchaser, and checks a credit.

\*\* Encipher a purchaser's purchase specification with a vender's encryption key or encryption key, and cipher system (11), and transmit to a vender's child station (2). Since only the information in connection with dealings of goods is relayed to a vender at this time and it transmits, the purchaser can do the purchase of goods anonymously. By arbitrary views, relay commission / settlement-of-accounts organization of a key station (1) generates and distributes a vender's encryption key or encryption key, and cipher system (11), and changes them. For example, renewal of the set-up number of times of dealings or the set-up time interval can be considered.

\*\* A vender checks the specification of an order and transmits ordering connection to relay commission / settlement-of-accounts organization together with the shipping timetable day of goods. Relay commission / settlement-of-accounts organization decrypts a code, checks whether it is in agreement with an order, and performs internal settlement processing.

\*\* Relay commission / settlement-of-accounts organization transmits dealing formation and a shipping timetable day to a purchaser.

\*\* If dispatch connection of goods is transmitted to relay commission / settlement-of-accounts organization from a vender, relay commission / settlement-of-accounts organization will settle dealings between a purchaser and a vender.

The settlement of accounts in the case of conducting the dealings accompanied by delivery of goods with a communications network is relaying relay commission / settlement-of-accounts organization, After receiving the information on shipping products from a vender, since settlement of accounts was performed, the negotiated transaction settlement of accounts same with settlement of accounts becoming possible to the same timing as a negotiated transaction, receiving goods by the thing in the shop, and paying a price was completed, and sent the goods accompanying dealings between a purchaser and a vender, but. Although money could not be collected or money was remitted, a risk of saying that goods are not shipped is mitigable.

[0034]The case where use a communications network for information service drawing 14, and service transactions, such as DETA offer, are performed to it is shown.

\*\* A service user enciphers URL (UniversalResource Locator) and service user attribution information (10) of a child station (2) of a purveyor of service, and transmits a service use claim to a service agency organization. A service agency organization decrypts a code and performs a service user's attestation and the check of trust.

\*\* A service agency organization generates or chooses an encryption key or an encryption key, and a cipher system (11), Generate a transaction number common to a service user purveyor of service, and encipher the encryption key or encryption key, and cipher system (11) of a transaction number and a service user which were enciphered with the encryption key or encryption key, and cipher system (11) of the purveyor of service to a service user, and it transmits to him, A transaction number is enciphered to a purveyor of service, and it transmits to him. The enciphered transaction number shows code confirmed information (23). A service user stores the transmitted transaction number and encryption key or encryption key, and a cipher system (11).

\*\* A service user transmits a transaction number to a purveyor of service, double-sign-izes the transaction number as which the purveyor of service was enciphered, and checks it.

\*\* A service user receives data service from a purveyor of service directly.

\*\* As for courtesy rates, billing is made by the service agency organization from a purveyor of service, and a service agency organization or a settlement-of-accounts organization settles accounts.

Even if the service user who has consented to settlement-of-accounts pulling down, and a purveyor of service do not deal with the problem of the settlement of accounts about service use directly, by passing a service agency organization, settlement of the expense of a small sum can be possible and service can be received simple.

[0035]The home banking using coding information exchange system is shown in drawing 15. The account opener who established the bank account to the financial institution C, With the encryption key or encryption key distributed from the financial institution C through the child station (2), and a cipher system (11). A user classification symbol (9), user-attributes information (10), and a child station classification symbol (12), It enciphers together with transfer information, transmits to the financial institution of a key station (1), it decrypts in the financial institution of a key station (1), an account opener is attested, and remittance processing is given to other account openers of the same financial institution C, or the account opener of other financial institutions D.

[0036]The system which performs positive delivery of the message by an electronic intelligence control mechanism is shown in delivery drawing 16 of a message. An e-mail transceiver person child station [ which was registered ] (2) Is in secret touch with an electronic intelligence control mechanism, and sets a password (16) as it at any time for every mail address. The set-up password (16) is transmitted to an electronic intelligence control mechanism.

\*\* Through a child station (2), the addresser a enciphers the mail address of a transmission destination to an electronic intelligence control mechanism, transmits to it, and performs the



Request to Send of a message.

\*\* An electronic intelligence control mechanism enciphers the addressee's b encryption key or encryption key, and cipher system (11) to the addresser a of the child station (2) A, and transmits to him.

\*\* The addresser a enciphers a message and transmits to the addressee b.

\*\* If the addressee's b decryption is successful, the child station (2) B will reduce one counter of the number of times which transmits reception decryption confirmed information to electronic intelligence control machine Seki, and can receive with set-up the encryption key or encryption key, and a cipher system (11). If the value of a counter reaches the set-up value, the encryption key or encryption key, and cipher system (11) will be updated from efg by drawing 16 to hij, and efg will be eliminated.

\*\* Give the addresser of a child station (2) delivery connection from an electronic intelligence control mechanism. If an electronic intelligence control mechanism distributes two or more encryption keys or encryption keys, and cipher systems (11) for every mail address beforehand and an addressee receives a message by a child station (2) only the set-up number of times, the encryption key or encryption key, and cipher system (10) will be eliminated from a child station (2). It connects that the message enciphered between the addresser a and the addressee b was sent via an electronic intelligence control mechanism, and delivery of a message can be checked.

[0037]The example of the information management of the intranet in a company is shown in intranet drawing 17. Child station (2) <sub>11</sub> connected to LAN (18) .. child station (2) 21 connected with child station (2) <sub>1k</sub> via the Internet .. child station (2)2j -- and, With the intranet connected via WAN (20) which comprises child station (2) jp connected by the remote access. By using the encryption key or encryption key, and cipher system (11) which it not only defends the information which accesses a server by a firewall (22), but generate and distribute it to the child station (2) to which the server of the key station (1) was connected, The system which can maintain the security of all the information which goes via the server of a key station (1) can be built. Even if it strengthens the security to the information from the outside with a firewall (22), when an organization becomes large, it is a big technical problem how the security inside a firewall is secured, but. The managing system of a disposable encryption key (Throw Away Encryptical key) solves this problem.

[0038]The case where a common encryption key or encryption key, and cipher system (11) are used by drawing 18 is shown. The child station a, the child station b, and the child station c share the common encryption key or encryption key, and cipher system (11) which were distributed from the key station (1), and information can be communicated only by authorized personnel. The renewal of an encryption key or an encryption key, and a cipher system (11) is set up by application service, and can respond to a member's change flexibly. Also when using a common encryption key or encryption key, and cipher system (11) for a bulletin board, the attestation of authorized personnel of a security function is high as compared with a password (16), and when restricting and discussing a problem, it can use.

[0039]

[Effect of the Invention]In order to pass an encryption key safely to all arbitrary communication partners' persons, the public key and the secret key method are performed, but. Since a key station can manage all the information when the purpose is attained by building an electronic intelligence network by the relation between a key station and a child station, and exchanging coding information only between a key station, a child station, and the registered user, If it manages with a disposable encryption key (Throw Away Encrypticalkey), a user will not be conscious even of existence of an encryption key (Throw Away Encrypticalkey), and management in the individual of security will become simple.

[0040]On the other hand, to the criminal act from the outside which went via WAN, access from the outside was restricted by the firewall and security is secured. However, if an organization becomes large, the importance of the security of the information network not only in the defense to the unjust information access from the outside but an inside will increase, but it cannot

defend in a firewall. Although One Time Pass Word is effective about attestation (Authentication) of the person himself/herself also with an internal information-and-telecommunications network, it cannot respond to the confidentiality of information. The coding information exchange system using a disposable encryption key (Throw Away Encryptical key) is intranet etc., and can secure security regardless of internal and external access.

[0041] Since the Internet originally comprises a client/server system, The utilization system of an information-and-telecommunications network can be constituted from relation between a key station and a child station in many cases, and the exchange system of coding information using a disposable encryption key (Throw Away Encryptical key) and a cipher system can expect the usage in a broad field.

[0042] The coding information exchange system of the disposable encryption key (Throw Away Encryptical key) managed between the relation between a key station (1), a child station (2), and a user (3) is used, Maintaining the security more than equivalent mostly with the private network using a dedicated line, even if a user does not know the contents of an encryption key or an encryption key, and the cipher system, he can build a safe private network using the open and cheap Internet and a public telephone network.

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[Translation done.]



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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1]The system configuration which manages information with a disposable encryption key (ThrowAway Encryptical key) with the information-and-telecommunications network which comprises a user, a child station, and a key station

[Drawing 2]The assignment of a function which performs coding information exchange between a user, a child station, and a key station

[Drawing 3]The method which performs renewal of the prepared encryption key or encryption key, and a cipher system for the information which manages a key

[Drawing 4](a) The number of the courses which pass an encryption key among N persons

(b) The number of the courses which constitute the relation between a key station and a child station, and pass an encryption key among N persons

(c) The number of the courses of an encryption key when the relation between a key station and a child station is constituted, and also a key station is constituted on it by having made the key station into the child station and a hierarchical key station and child station are constituted

[Drawing 5]The method which a user registers to a key station through a child station

[Drawing 6]A user registers to a key station through two or more child stations only by the information communication of a communications network.

[Drawing 7]The managing system of the disposable encryption key (Throw Away Encryptical key) generated between a key station and a child station with its sleeves tied back

[Drawing 8]The managing system of the encryption key or encryption key which transmitted to the child station from the key station, and the disposable encryption key (Throw Away Encryptical key) used for encryption with a cipher system

[Drawing 9]Coding information exchange system which transmits and receives the information which relayed the key station and was enciphered between child stations

[Drawing 10]The application service system which performs information processing which a key station waits for the information between child stations to gather, and is concerned between child stations.

[Drawing 11]Coding information exchange system which generates or chooses and distributes an encryption key or an encryption key, and a cipher system with a key station common to between child stations

[Drawing 12]The system with which a key station and a child station communicate coding information directly with a disposable encryption key (Throw Away Encryptical key)

[Drawing 13]The transaction system on the communications network accompanied by delivery of goods using a disposable encryption key (Throw Away Encryptical key)

[Drawing 14]The system which performs an information service using a disposable encryption key (Throw Away Encryptical key)

[Drawing 15]The system by which an account opener performs a home banking via an open network among financial institutions.

[Drawing 16]The system which delivers a message using a disposable encryption key (Throw Away Encryptical key)

[Drawing 17]The system which makes high information communication of security possible

regardless of the inside and outside of a firewall with the intranet which passed LAN and WAN using the disposable encryption key (Throw Away Encryptical key)

[Drawing 18]The information exchange method using a common encryption key or encryption key, and cipher system

[Description of Notations]

1. Key station
2. Child station
3. User
4. Application SOFUTOUE for key stations using coding information switching function
5. Application SOFUTOUE for child stations using coding information switching function
6. Assignment function of key station of coding information switching function
7. Assignment function of child station of coding information switching function
8. Assignment function of user of coding information switching function
9. User classification symbol
10. User-attributes information
11. An encryption key or an encryption key, and a cipher system
12. Child station classification symbol
13. Key station encryption key management data
14. Child station encryption key management data
15. Information which carries out updating management of the key
16. Password
17. Internet
18. LAN(Local Area network)
19. Public telephone network
20. WAN(Wide Area network)
21. Information packet
22. Firewall
23. Code confirmed information

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[Translation done.]

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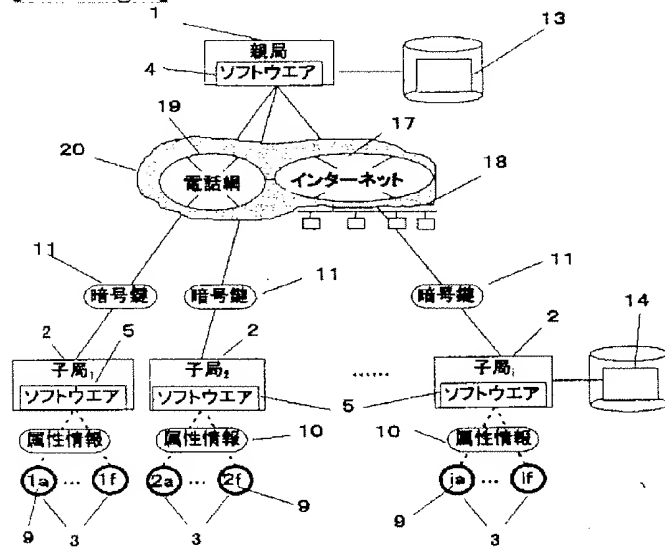
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2.\*\*\* shows the word which can not be translated.

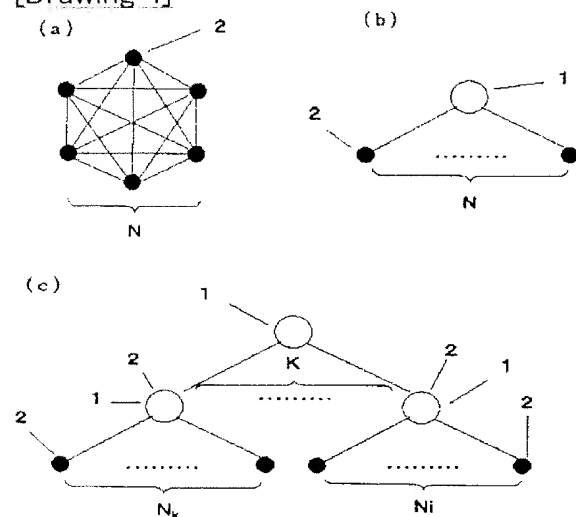
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## DRAWINGS

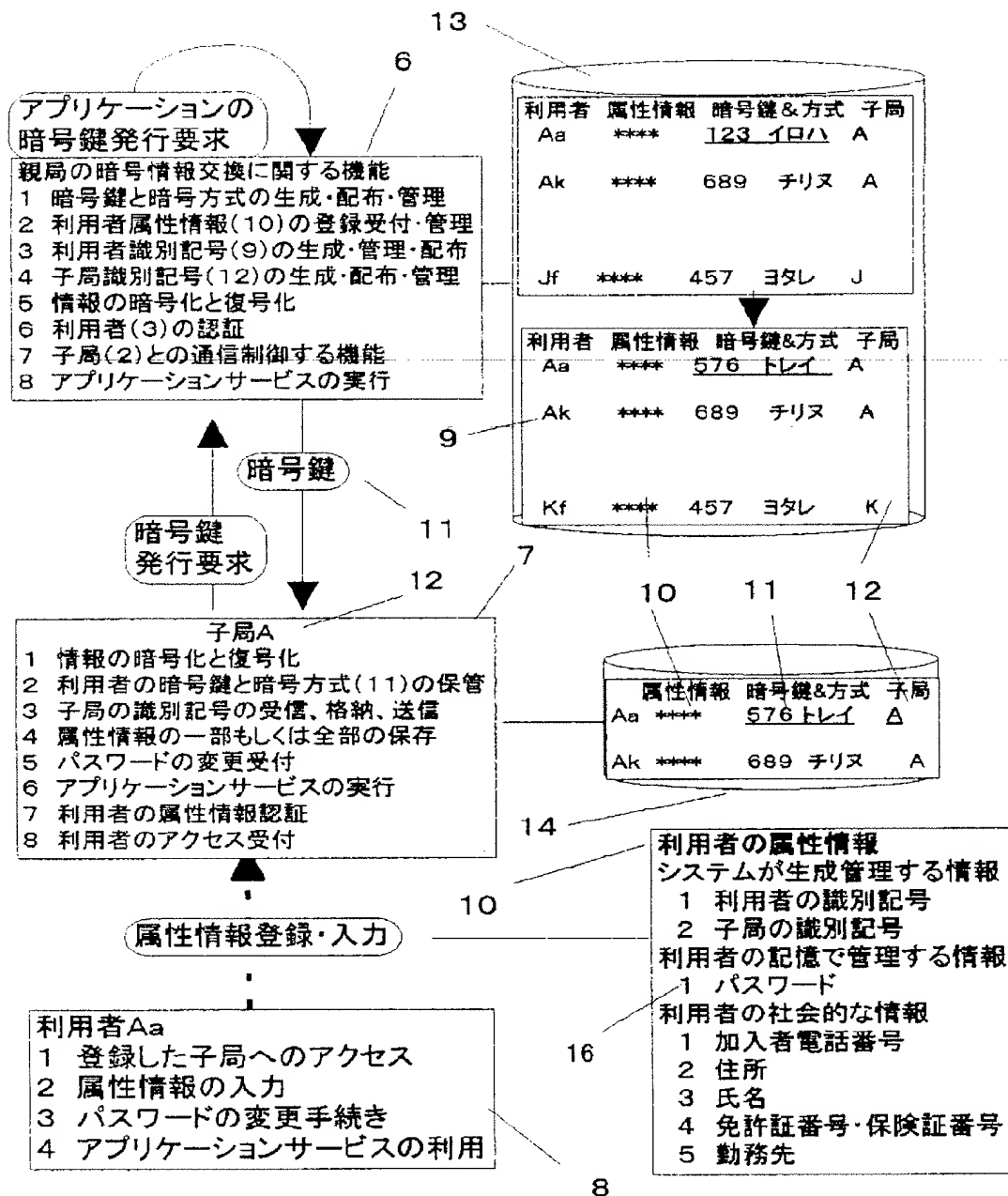
[Drawing 1]



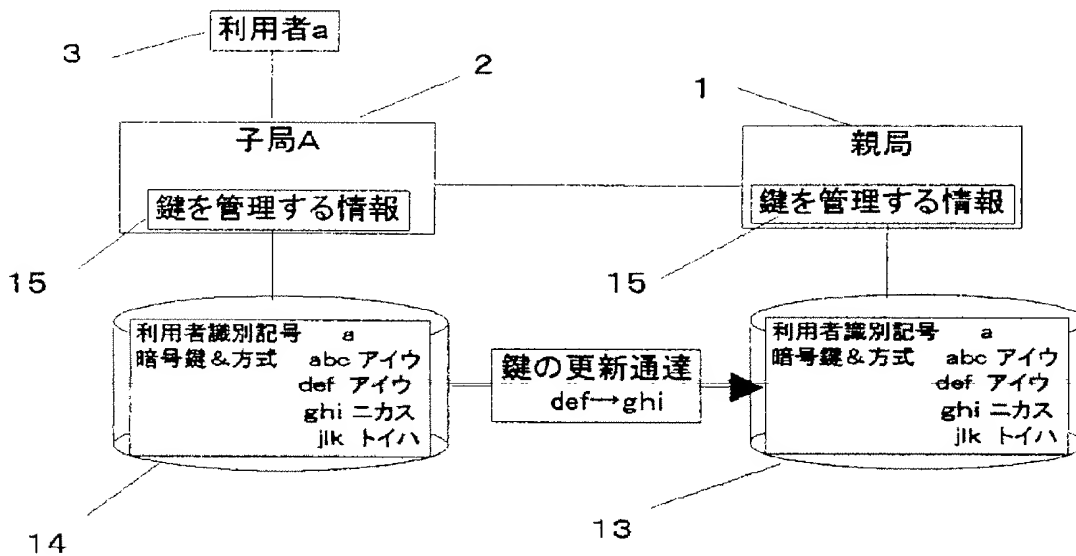
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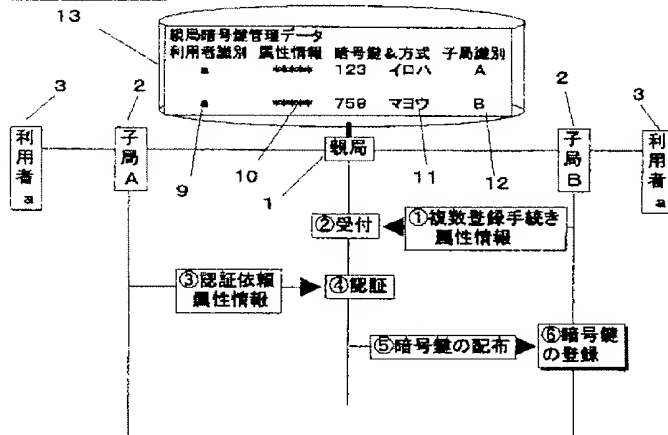
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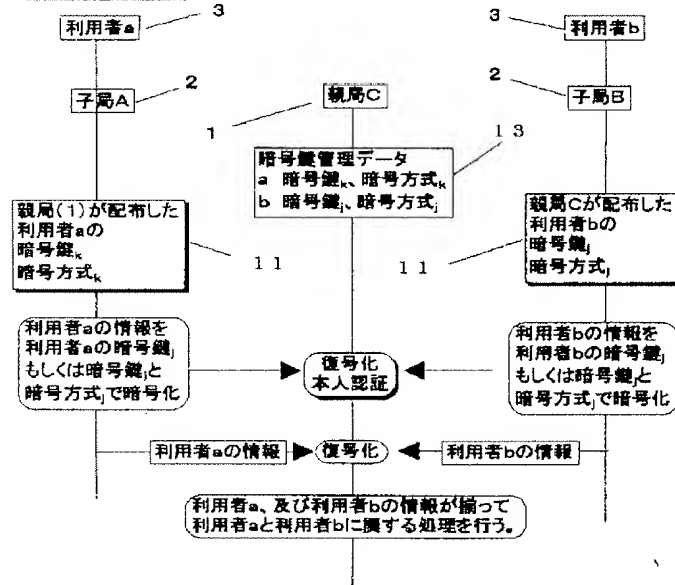
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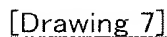
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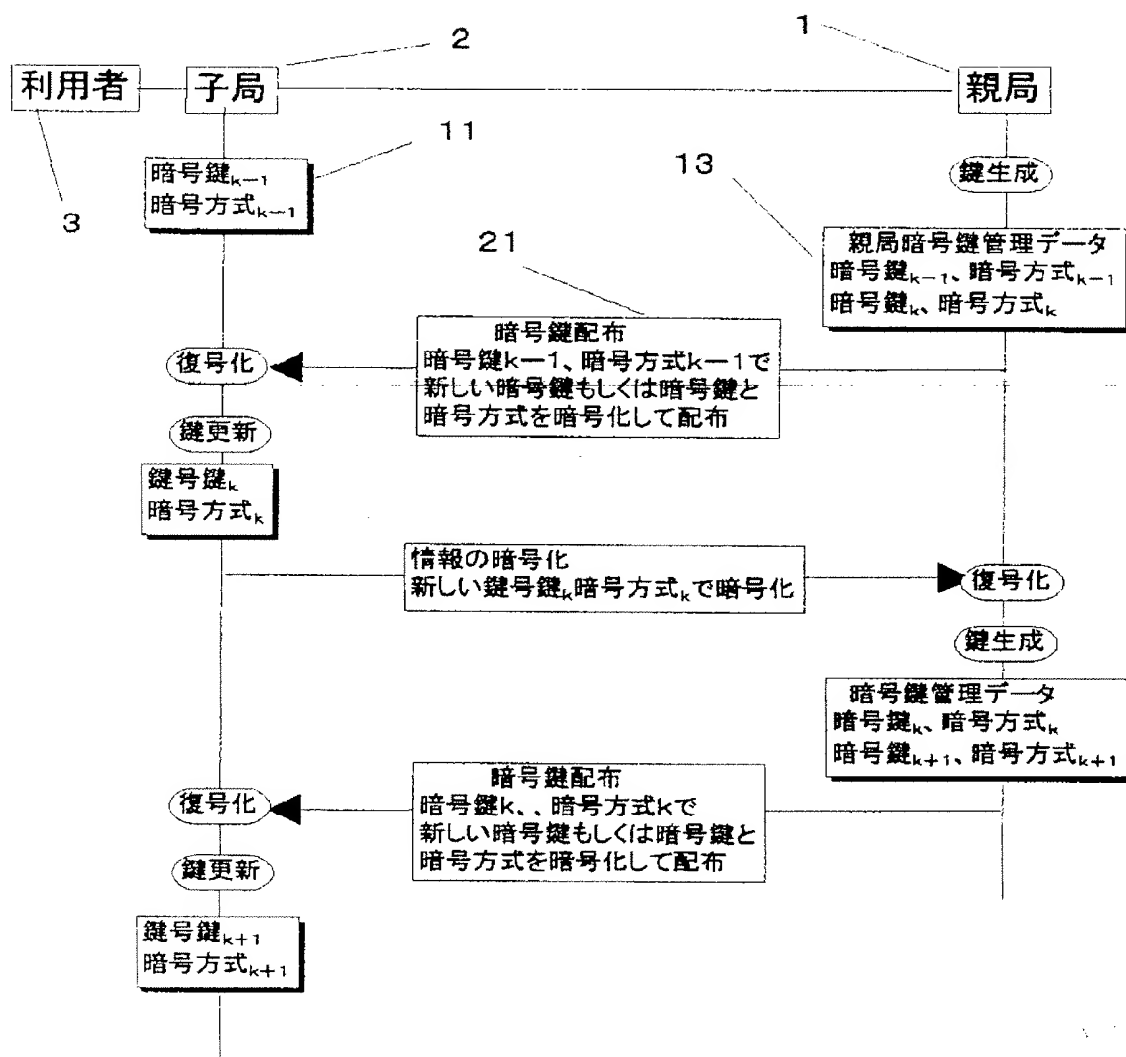


[Drawing 10]

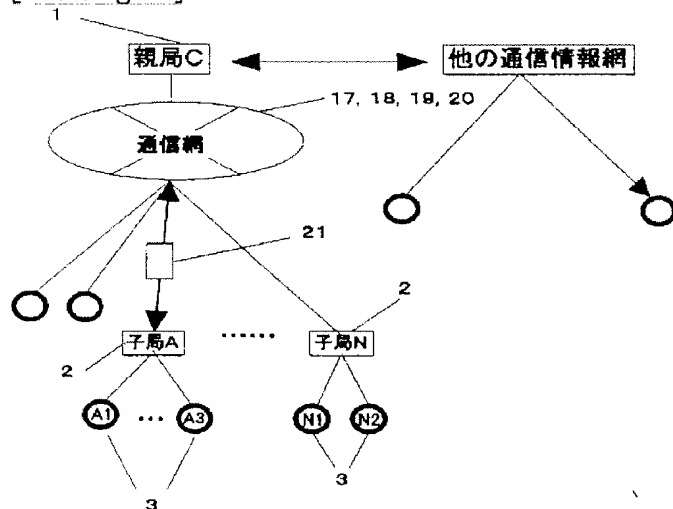


[Drawing 11]

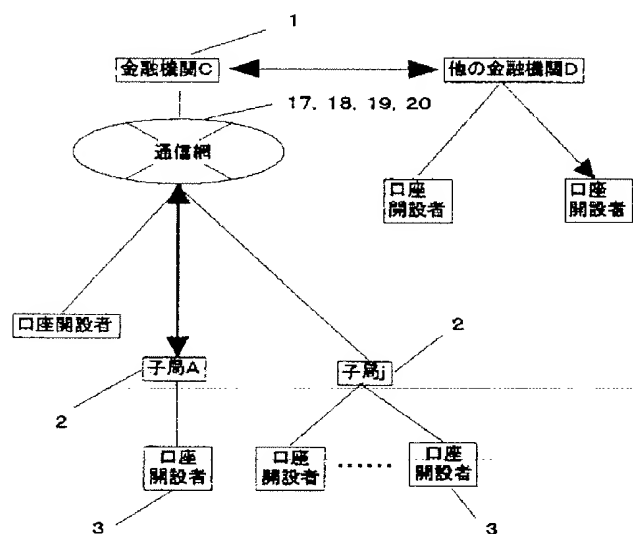




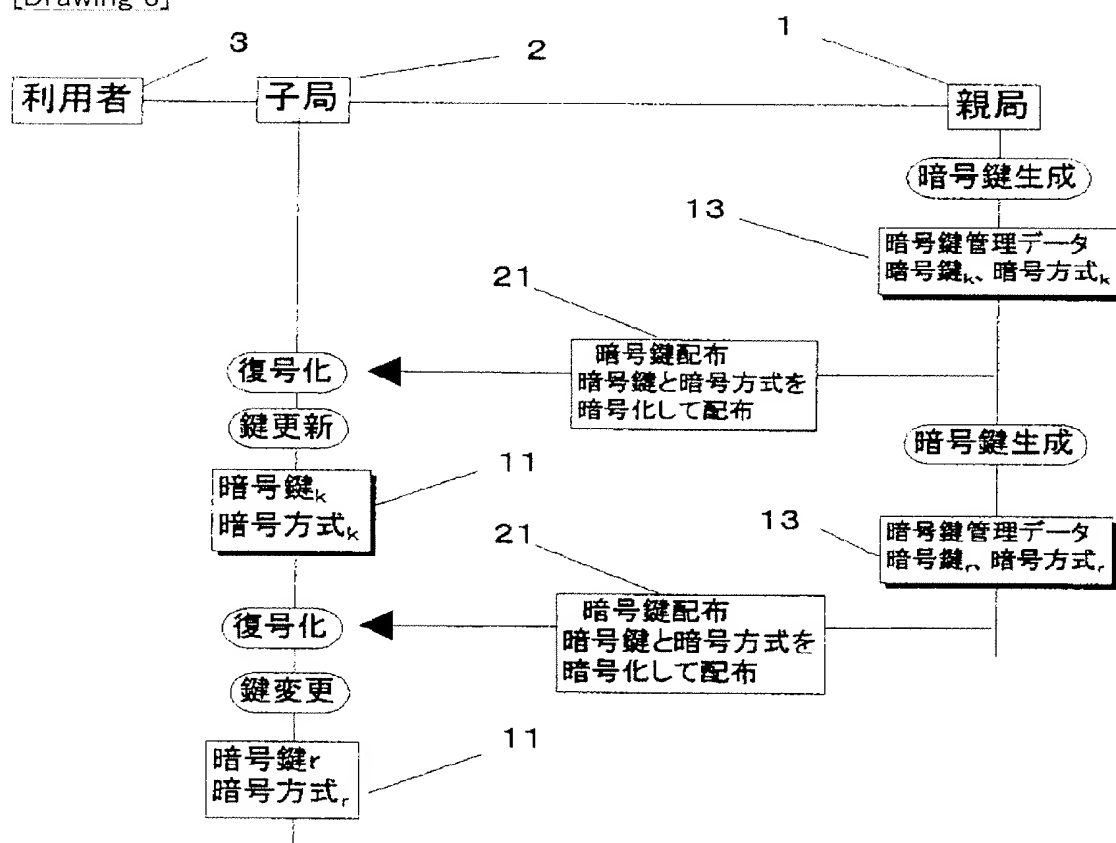
[Drawing 12]



[Drawing 15]

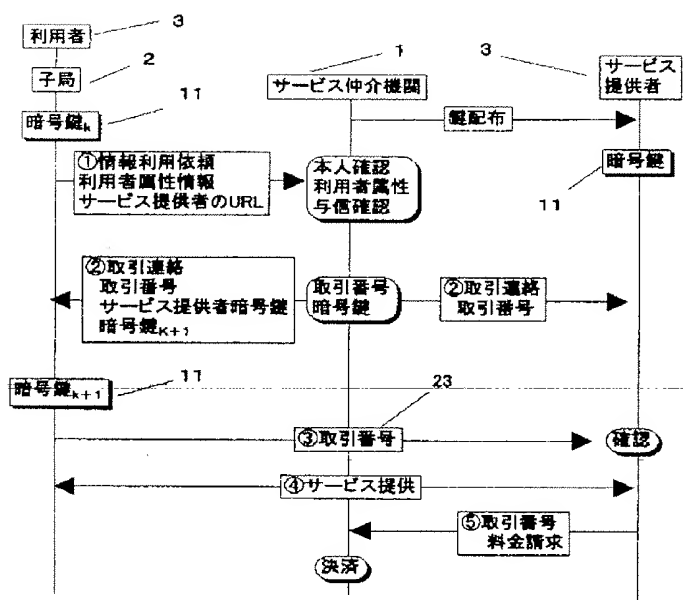


[Drawing 8]

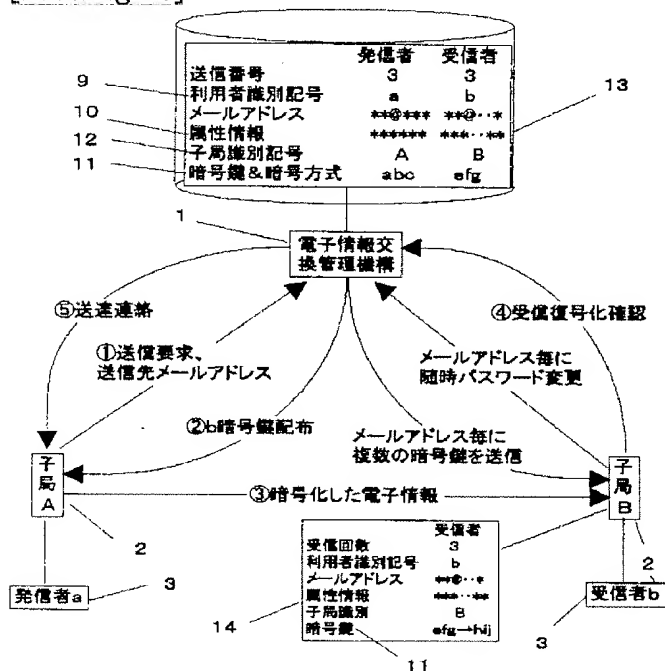


[Drawing 14]

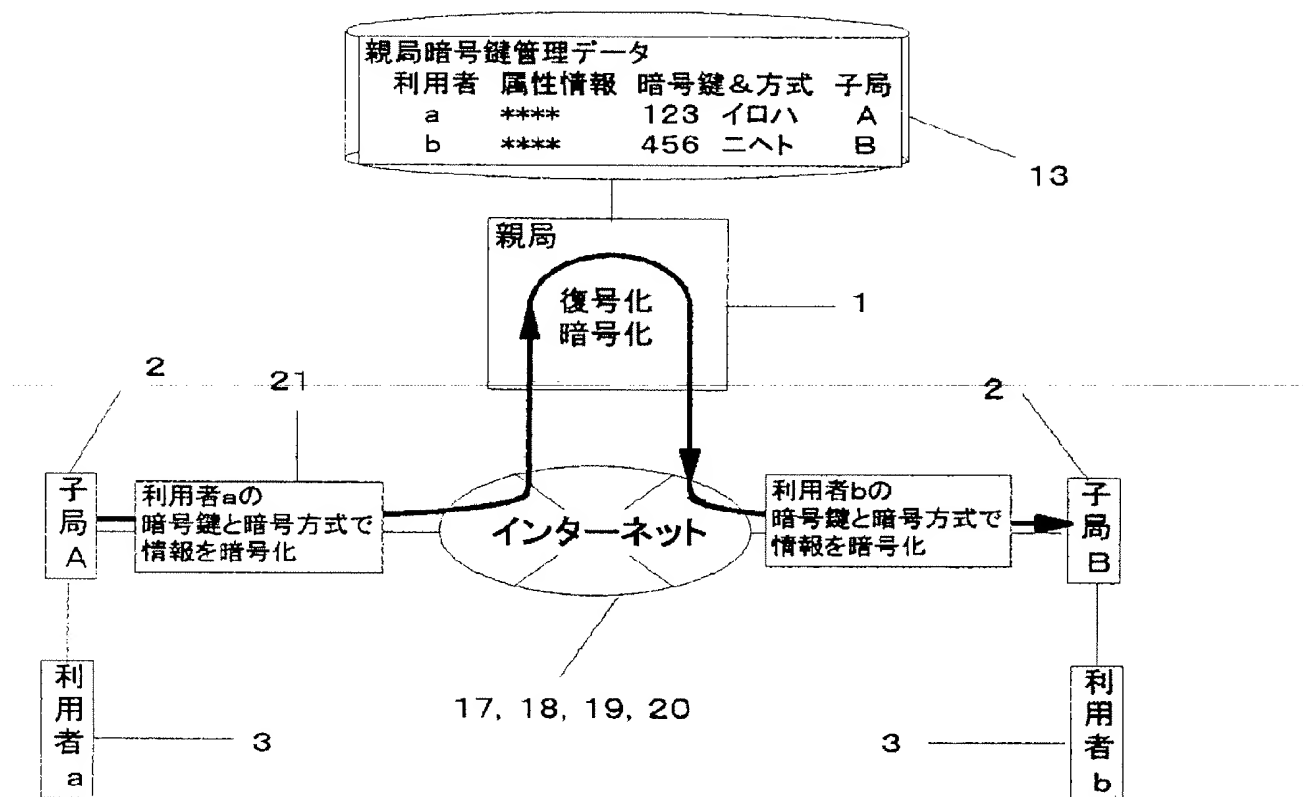




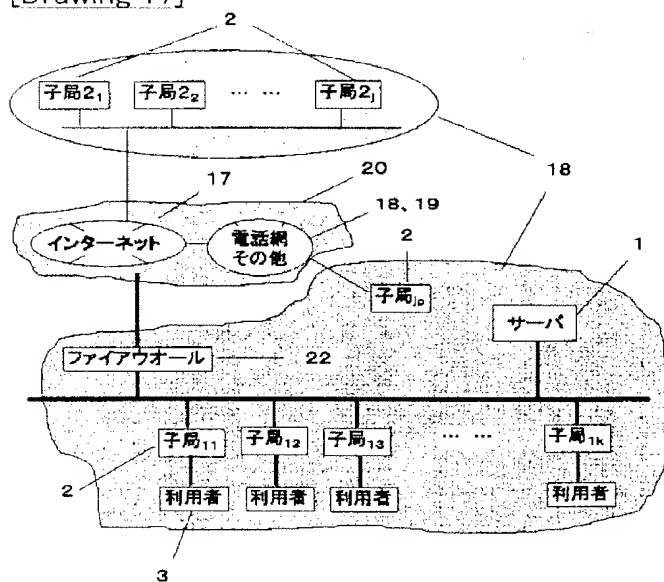
[Drawing 16]



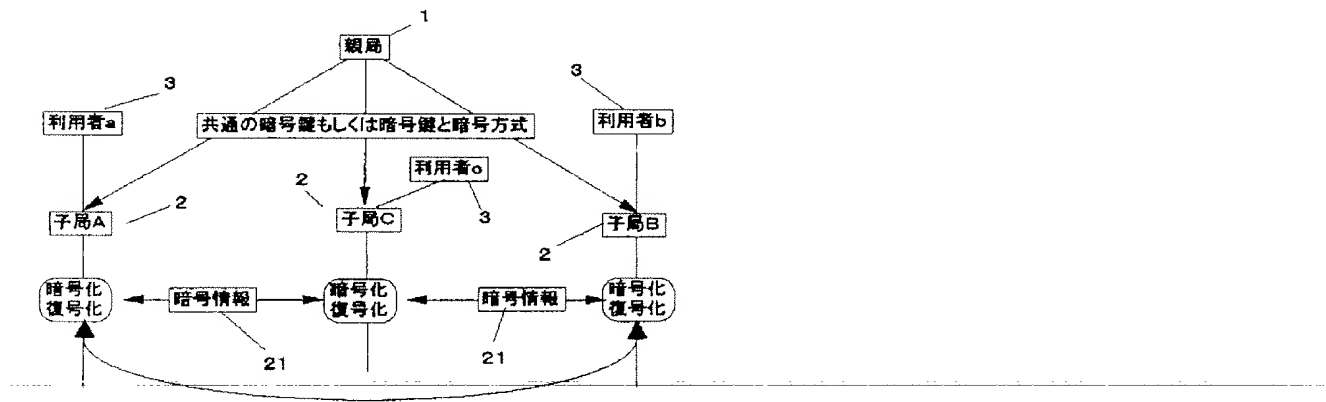
[Drawing 9]



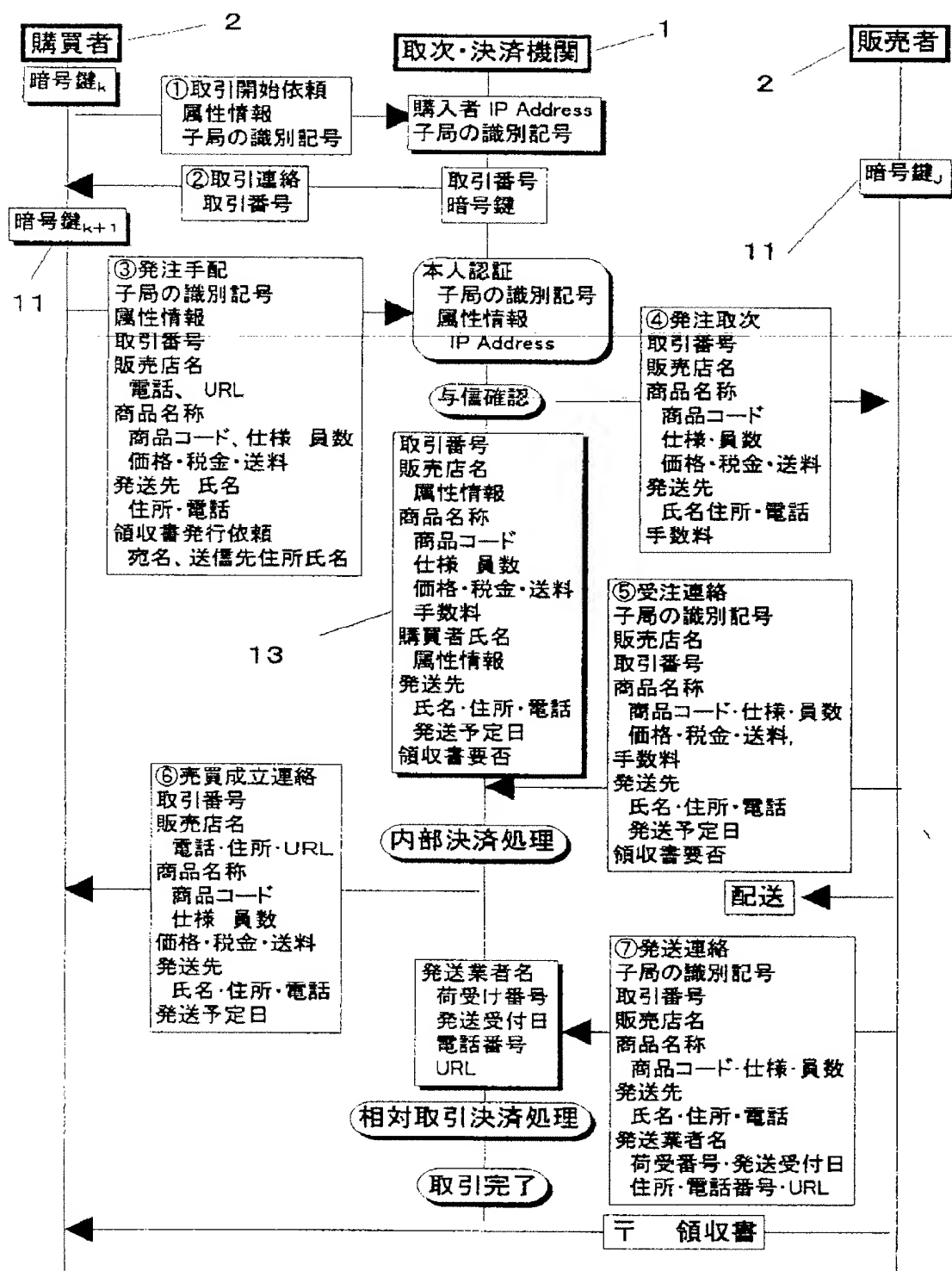
[Drawing 17]



[Drawing 18]



[Drawing 13]



[Translation done.]

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Filing date: September 12, 1997

## Specification

Title of Invention: Cryptographic information exchange system

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### Detailed Description of the Invention

Embodiment examples

Delivery transaction

Fig. 13 shows an example of a commodities sales transaction system in which delivery of a commodity is performed via a communication network. A parent station (1) relays an order from a purchaser to a distributor, and performs a settlement of the transaction when the sales agreement is reached. A purchaser at a child station (2) places an order of a commodity that he or she would like to purchase, and a distributor at a child station (2), upon receipt of the order, delivers the commodity directly to the delivery destination. A purchaser registered at a plurality of child stations having signed up and connected to the transaction relay/settlement organization and a distributor registered at a plurality of child stations constitute a commercial transaction communication network. The following describes an embodiment example where the parent station (1) relays information of a user (3) for information exchange. The transaction procedure of Fig. 13 is as follows.

- (1) A transaction start request of a purchaser is transmitted to the transaction relay/settlement organization together with a user identification number (9), user attribute information (10), and a child station identification number (12), and the transaction relay/settlement organization decrypts the same. The user identification number (9), the user attribute information (10), and the child station identification number (12) are used to confirm a purchaser.
- (2) The transaction relay/settlement organization generates a transaction number, and an encryption key of a purchaser (or an encryption key and an encryption method (11)), and distributes the same to the purchaser. Upon reception by the user, the encryption key (or the encryption key and the encryption method (11)) is updated at the child station (2).
- (3) The purchaser encrypts the URL (Universal Resource Locator) of the child station (2) of the distributor, information of a commodity that the purchaser wants to purchase, and the attribute information of the purchaser, and transmits the result to the transaction

relay/settlement organization. The transaction relay/settlement organization decrypts the encryption, performs authentication of the purchaser, and confirms the credit.

- (4) Then the purchase specification of the purchaser is encrypted using an encryption key (or an encryption key and an encryption method (11)) of the distributor, and is transmitted to the child station (2) of the distributor. At this time, only information involving the commodity transaction is transmitted by means of relay to the distributor, and so the purchaser is able to purchase the commodity anonymously. The encryption key (or the encryption key and the encryption method (11)) of the distributor is generated and distributed, for being changed, by the transaction relay/settlement organization according to an arbitrary concept of its own. For example, it is contemplated to update the number of times of transaction having been set, or in the time interval having been set.
- (5) The distributor confirms the specification of the order, and informs the transaction relay/settlement organization of the order receipt and a scheduled delivery date. The transaction relay/settlement organization decrypts the encryption, confirms whether the decrypted result matches the order, and performs internal settlement processing.
- (6) The transaction relay/settlement organization reports the transaction agreement and the scheduled delivery date to the purchaser.
- (7) When the distributor has transmitted a commodity delivery report to the transaction relay/settlement organization, the transaction relay/settlement organization performs the transaction settlement between the purchaser and the distributor. In the case of performing transaction involving commodity delivery on a communication network, it is possible to perform the settlement after receiving the commodity delivery report by the relay of the transaction relay/settlement organization. Accordingly, it becomes possible to perform the settlement at the same timing as the timing of the relative transaction, which enables a similar relative transaction settlement as in the case where an actual commodity is purchased by cash at a shop. This enables to alleviate a risk of causing such problems that a distributor has delivered a commodity but a purchaser does not pay for it, and that a purchaser has paid for a commodity but the commodity is not delivered, which are possible between a purchaser and a distributor.

FIG. 13

①: transaction start request

attribute information

identification number of child station

(A): purchaser authentication

identification number of child station

attribute information

IP Address

② transaction report

transaction number

③: order placement

identification number of child station

attribute information

transaction number

name of distributing agent

telephone number, URL

commodity name

commodity code, specification, item

price, tax, shipping cost

delivery destination

name, address, telephone number

receipt issuance request

destination, transmission destination address/name

④: order relay

transaction number

name of distributing agent

commodity name

commodity code, specification, item,

price, tax, shipping cost

delivery destination

name/address, telephone number

handling charge

13: transaction number

name of distributing agent

Attribute information

commodity name  
commodity code, specification, item  
price, tax, shipping cost  
handling charge  
name of purchaser  
attribute information

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delivery destination  
name, address, telephone number  
scheduled delivery date  
whether receipt is required or not

⑤: order receipt report

identification number of child station  
name of distributing agent  
transaction number  
commodity name  
commodity code, specification, item  
price, tax, shipping cost  
handling charge  
delivery destination  
name, address, telephone number  
scheduled delivery date  
whether receipt is required or not

⑥: sales agreement report

transaction number  
name of distributing agent  
telephone number, address, URL  
commodity name  
commodity code, specification, item  
price, tax, shipping cost  
delivery destination  
name, address, telephone number  
scheduled delivery date

(B): delivery agent name

shipping order number  
delivery receipt date



telephone number

URL

⑦: delivery report

identification number of child station

transaction number

name of distributing agent

commodity name

commodity code, specification, item

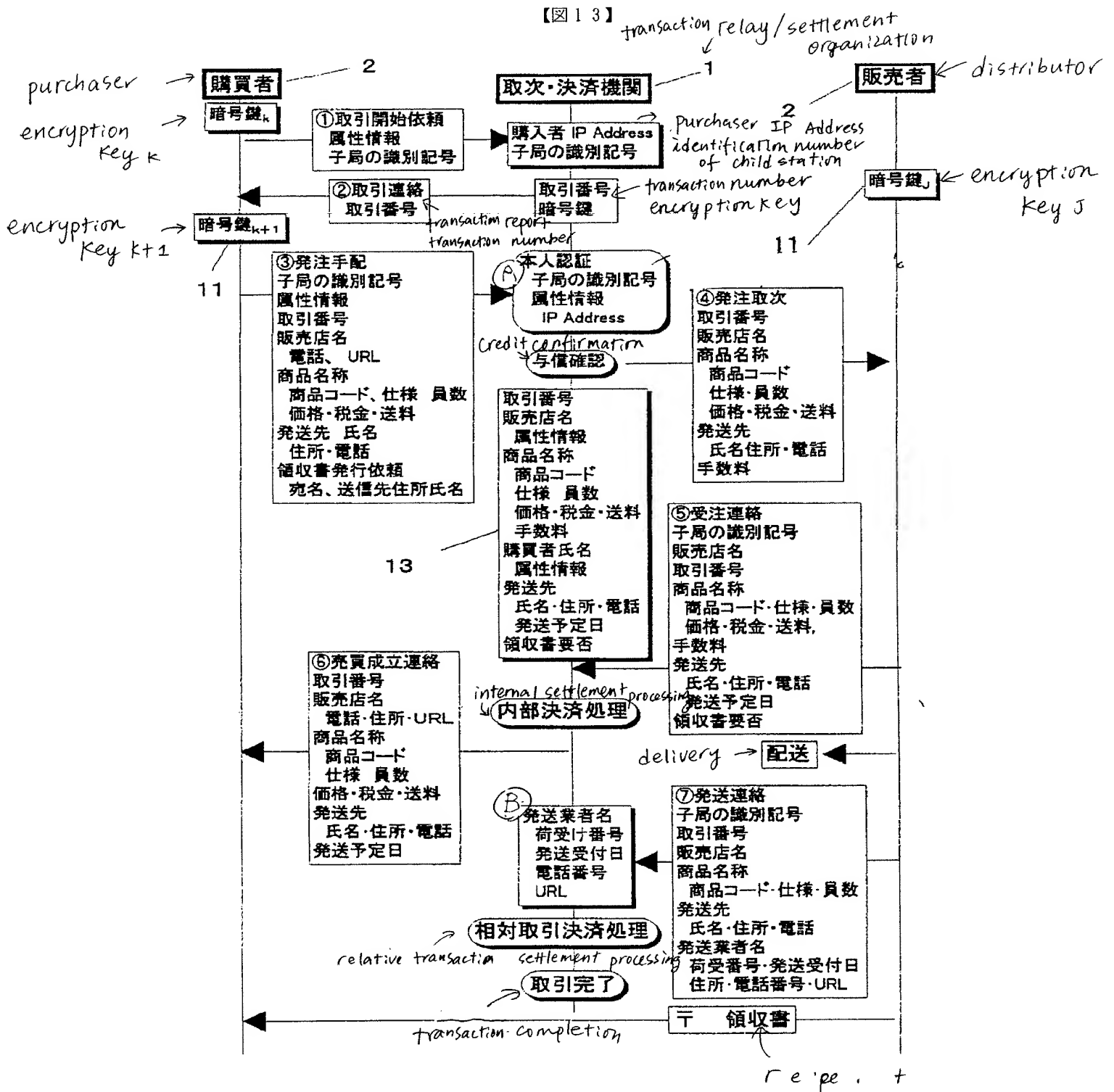
delivery destination

name, address, telephone number

name of delivery agent

shipping order number, delivery receipt date

address, telephone number, URL



(19)日本国特許庁 (J P)

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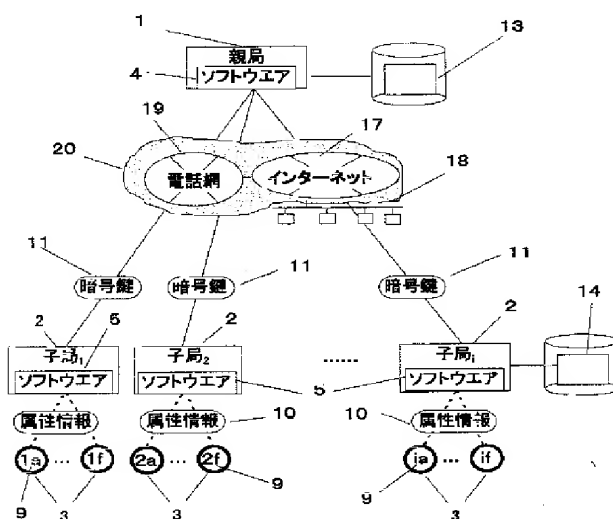
神奈川県平塚市日向岡2丁目6番地17号

(54)【発明の名称】 暗号情報交換方式

(57)【要約】 (修正有)

【課題】オープンな情報通信網で通信相手を特定しセキュリティを保って情報交換を行う。

【解決手段】アプリケーションサービスもしくは利用者3の要求で親局1は暗号鍵もしくは暗号鍵と暗号方式11を生成し、親局暗号鍵管理データ13へ利用者識別記号9と対応して暗号鍵もしくは暗号鍵と暗号方式11を更新管理し、子局2へ配布する。子局2は子局暗号鍵管理データ14へ利用者識別記号9と対応して配布された暗号鍵もしくは暗号鍵と暗号方式11を更新管理する。利用者3は子局2で格納された暗号鍵もしくは暗号鍵と暗号方式11で情報を暗号化もしくは復号化して情報の送受信を行いアプリケーションサービスの実行結果を利用する。



## 【特許請求の範囲】

【請求項1】インターネット(17)、LAN(18)並びに公衆電話網(19)を含むWAN(20)を経由して、親局(1)へ加入接続した子局(2)並びに、利用者属性情報(10)を子局(2)を通じてもしくは直接親局(1)へ登録し、親局(1)が生成した利用者識別記号(9)を授けられた利用者(3)の三者で構成するアプリケーションサービスを実行する通信網において、アプリケーションサービスもしくは利用者(3)からの暗号鍵もしくは暗号鍵と暗号方式(11)の配布要求で、親局(1)は利用者(3)毎の暗号鍵もしくは暗号鍵と暗号方式(11)を生成又は選択して、利用者(3)の利用者識別記号(9)が格納されている子局(2)へ平文もしくは暗号化して配布し、親局暗号管理データ(13)に利用者(3)毎の暗号鍵もしくは暗号鍵と暗号方式(11)を更新管理し、子局(2)は子局暗号管理データ(14)に利用者(3)毎の暗号鍵もしくは暗号鍵と暗号方式(11)を更新管理し、利用者(3)は子局(2)もしくは親局(1)を通じて暗号鍵もしくは暗号鍵と暗号方式(11)を使用して情報を暗号化もしくは復号化して他の利用者(3)もしくは親局(1)との間で情報の交信を行う暗号情報交換方式。

【請求項2】請求項1において、子局(2)が最初に親局(1)へ接続する時に、親局(1)は子局識別記号(12)を生成し、親局暗号鍵管理データ(13)に、子局識別記号(12)を通して利用する利用者(3)の利用者識別記号(9)を参照できるように記録、保管管理し、子局識別記号(12)もしくは暗号化した子局識別記号(12)を子局(2)へ配布し、子局(2)は配布された自局の子局識別記号(12)を子局暗号鍵管理データ(14)に格納し、更に、利用者(3)が親局(1)へ登録する時に、親局(1)から子局(2)へ配布される利用者識別記号(9)も子局暗号鍵管理データ(14)へ格納し、利用者(3)が子局(2)もしくは親局(1)を通してアプリケーションサービスへ参加する時、子局暗号鍵管理データ(14)もしくは親局暗号鍵管理データ(13)で格納されていない利用者識別記号(9)の利用者(3)はアプリケーションサービスへの参加を拒絶され、格納されている利用者識別記号(9)の利用者(3)は子局(2)もしくは親局(1)を通して、利用者識別記号(9)及び利用者属性情報(10)と子局識別記号(12)と一緒に親局(1)へ送信し、親局(1)は利用者(3)が子局(2)もしくは親局(1)を通してアプリケーションサービスに参加している事を確認して利用者(3)の認証を行う暗号情報交換方式。

【請求項3】請求項1もしくは請求項2に於いて、既に利用者(3)が子局(2)もしくは親局(1)を通して親局(1)に登録している場合、同じ利用者(3)が利用者識別記号(9)を格納した別の子局(2)を通して

アプリケーションサービスへ参加できる暗号情報交換方式

【請求項4】請求項3に於いて、既に親局(1)へ登録の済んだ利用者(3)は利用者識別記号(9)が格納されていない子局(2)もしくは親局(1)を通じてアプリケーションサービスを利用する手続きを行い、既に利用者識別記号(9)が格納されている子局(2)を通して、認証を親局(1)に申請し、利用者(3)を認証した親局(1)は親局暗号鍵管理データ(13)へ利用者識別記号(9)毎に子局識別記号(12)を記録、保管管理し、利用者識別記号(9)が格納されていない子局(2)へ利用者識別記号(9)を配布し、子局(2)は子局暗号鍵管理データ(14)へ利用者識別記号(9)を格納し、利用者(3)は新しい子局(2)もしくは親局(1)を通してアプリケーションサービスへ参加できる利用者(3)の認証を行う暗号情報交換方式。

【請求項5】請求項3に於いて、親局(1)から子局(2)へ利用者(3)毎に一度に複数の暗号鍵もしくは暗号鍵と暗号方式(11)を配布しておき、配布済みの複数の暗号鍵もしくは暗号鍵と暗号方式(11)を親局(1)と子局(2)の間で鍵を更新管理する情報(15)で親局(1)及び子局(2)の暗号鍵もしくは暗号鍵と暗号方式(11)を更新する暗号情報交換方式

【請求項6】請求項5において、 $N_i$  個の子局(2)を接続した親局(1)から、 $N_k$  個の子局(2)を接続した親局(1)がK個だけ存在したとして、K個の親局(1)を子局(2)として接続された親局(1)を設けた事を特徴とする、階層的な暗号情報交換方式

【請求項7】請求項6に於いて、親局(1)は子局(2)に既に配布した暗号鍵もしくは暗号鍵と暗号方式(11)で新しい暗号鍵もしくは暗号鍵と暗号方式(11)を暗号化して子局(2)に配布し、子局(2)は既に受信している暗号鍵もしくは暗号鍵と暗号方式(11)で、受信した暗号化された暗号鍵もしくは暗号鍵と暗号方式(11)を復号化し、子局(2)の子局暗号鍵管理データ(14)に格納されている暗号鍵もしくは暗号鍵と暗号方式(11)を更新格納する暗号情報交換方式。

【請求項8】請求項6に於いて、親局(1)は新しい暗号鍵もしくは暗号鍵と暗号方式(11)を既に子局(2)へ配布した暗号鍵もしくは暗号鍵と暗号方式(11)を使用せず暗号化して子局(2)に配布し、子局(2)はこの暗号を復号化して子局暗号鍵管理データ(14)に格納する暗号情報交換方式。

【請求項9】請求項7もしくは請求項8に於いて、送信元の利用者(3)が送信したい単数もしくは複数の利用者(3)宛の情報を暗号化して親局(1)に送信し、親局(1)は暗号を復号化して、送信先の利用者(3)の暗号鍵もしくは暗号鍵と暗号方式(11)で暗号化し、送信先の利用者識別記号(9)が格納されている子局

(2)宛に送信し、送信先の利用者(3)は暗号を復号化して送信元の利用者(3)からの情報を受信し、送信元と送信先の間で親局(1)を中継して暗号情報の交信を行う暗号情報交換方式。

【請求項10】請求項7もしくは請求項8に於いて、利用者(3)が交信したい単数もしくは複数の利用者(3)と直接交信を行う前に、親局(1)は受信元の利用者(3)の暗号鍵もしくは暗号鍵と暗号方式(11)を送信元の利用者識別記号(9)が格納されている子局(2)へ配布し、送信元の利用者(3)は配布された暗号鍵もしくは暗号鍵と暗号方式(11)で情報を暗号化して、送信先の利用者(3)へ直接送信し、受信した利用者(3)は暗号を復号化し情報を交信する暗号情報交換方式。

【請求項11】請求項7もしくは請求項8に於いて、アプリケーションサービス、もしくは利用者(3)の要求で、親局(1)は限定された利用者(3)に共通の暗号鍵もしくは暗号鍵と暗号方式(11)もしくは暗号確認情報(23)を生成もしくは選択し、利用者(3)の利用者識別記号(9)が登録された子局(2)もしくは親局(1)へ配布し、暗号情報の交信を行う暗号情報交換方式

【請求項12】請求項7もしくは請求項8に於いて、利用者(3)と親局(1)の間で暗号化した情報の交信を行う暗号情報交換方式。

【請求項13】請求項9及び請求項10及び請求項11の情報交信方式において、アプリケーションサービスに必要な複数の利用者(3)の情報が時間的にずれて親局(1)に着信する場合、アプリケーションサービスで必要な情報が親局(1)に全て着信した後、複数の利用者(3)に関わるアプリケーションサービスの処理を親局(1)が行う暗号情報交換方式。

【請求項14】請求項12及び請求項13において、暗号情報交換機能を使う子局用のアプリケーションソフトウェア(5)をインストールし、子局(2)に格納されている利用者識別記号(9)の利用者(3)が直接入力操作を行わずアプリケーションサービスが子局(2)に格納されている利用者識別記号(9)の利用者(3)に代わって、その他の利用者(3)との暗号情報を交信する暗号情報交換方式。

【発明の詳細な説明】

【0001】

【目的】通信網として、LAN、公衆電話網の交換接続網、インターネットは安価でオープンな通信網として世界的に拡充しつつある。インターネット及び電話網を含むWANに参加した全の人々にとってオープンで接続が容易なだけ、情報の内容を第三者が容易に覗ける事ができる。従って、これらの通信網の弱点は通信網のセキュリティを如何に克服するかである。通信網上のセキュリティの問題として、予期しない相手が通信設備に侵入し、

データやシステムの盗聴や破壊行為を如何にして防ぐかと言う問題やシステムやデータを破壊するウイルスから如何に身を守るかの外に、データ交信中、それらの情報を盗聴したり、交信相手が見えない通信網の性質を悪用した利用を如何に防ぐのかと言う問題がある。

【0002】交信中に生じる問題を防ぐには、交信相手が確かに間違いない相手だと如何にして確認するかの認証の問題、及び、情報を当事者以外内容を理解できないようにする情報暗号化を行う上で、情報を暗号化する暗号鍵のやりとりを如何に安全に行うかと言う問題の2点に絞られて来る。この発明は交信している相手が正しい相手だといかにして確認するか及び、関係者だけが使用できる様に暗号鍵や暗号方式を如何にして安全にやり取りするかに関するものである。

【0003】

【発明の属する技術分野】電子情報通信網での安全な情報交換を如何に行うかの暗号情報交換方式に関している。

【0004】

【従来の技術】情報通信網での安全な情報交換を如何に行うか古くから研究が行われているが、近年インターネットの普及につれて、安全な情報の交信が重要になってきている。情報通信網で交信される情報の安全性を確保する為に、情報を暗号化して送信し関係者以外判読出来ないようにするための、情報を暗号化する暗号方式や、暗号鍵を安全に届けるために暗号鍵を公開鍵と秘密鍵の双方を使って本人を認証し、情報を暗号化及び復号化する方式に関する提案がなされている。又、1回限りのパスワード(16)を発生させる方法で、本人の認証を行うなどが研究されている。

【0005】

【発明が解決しようとする課題】オープン性の高い情報通信網での情報交信の課題は、情報交換や、商取引等での利用に対して次の様な課題がある。

- 1 暗号鍵配布の管理工数がかかる
- 2 個人が暗号鍵を記憶するリスクからの解放
- 3 盗聴、暗号解読に対するセキュリティの確保
- 4 デリバリー決済時における、決済システムのリスクの減少
- 5 本人の認証性の確保

【0006】N人の間で相互に暗号鍵を配布すると、(図4) aにおいて、 $N(N-1)/2$ の経路で暗号鍵を配布する管理工数が発生する。このコストを減少するのが一つの課題なる。

【0007】暗号化した情報を暗号鍵で復号する為には暗号鍵を記憶していなければならない。暗号が簡単に解読されない様にするために暗号鍵が長くなり、人間が記憶する限界を超えて来る。そうなると、暗号鍵を管理するためのパスワード管理が必要になったりして、結局人間の記憶力の限界に対応した管理が要請される。ICカ

ードを使って、秘密鍵を人間の記憶と切り離す等の試みも考えられるが、カードを紛失した場合の問題など、個人で管理する暗号鍵のセキュリティは必ずしも強くない。このような暗号鍵の管理は情報通信網を気軽に利用出来る機会を遠ざける。

【0008】情報通信網での交信を盗聴されたり、暗号化していても解読されるのを如何に防ぐか大きな課題である。更に、情報が盗まれるだけでなく、盗まれた情報を使用して、本人に成りすまして窃盗を働いたりされると被害を大きくする。このような被害を如何に防ぐか中心的な課題である。

【0009】店頭販売に比較して、通信網上で商品と代金を如何に決済するかが一つの課題である。商品を配送した時に代金と引き替えに商品を渡したり、代金を先に送金した後、商品を送達したり、もしくは、商品を送達後代金を振り込んだりしている。商品の配送を伴う情報網上で商取引では代金と商品を相対決済できないと、商品又は代金を払った方がリスクを負う。情報通信網での取引にも相対取引が望ましい。

【0010】本人を偽って窃盗を行って本人に被害を与えたり、他人の情報を盗み出したり、他人のソフト財産を破壊したりする犯罪は情報通信網で大きな課題である。通信の相手が本人か否か如何にして認証するか最大の課題である。

【0011】

【課題を解決する為の手段】この発明の概念は、親局が必要に応じて、使い捨ての暗号鍵[Throw Away Encryptical key]もしくは使い捨ての暗号鍵と暗号方式を生成し、子局に配布するので、利用者の暗号鍵もしくは暗号鍵と暗号方式は変化してゆく、そのため、盗聴しようとしても、暗号を解読しなければならず、もしある時間を経過して暗号の解読に成功したとしても、使い捨ての暗号鍵もしくは使い捨ての暗号鍵と暗号方式が変化しているので、利用者に成りすまそうとしても、親局が配布した暗号鍵もしくは暗号鍵と暗号方式と異なっているので、利用者に成りすまそうとしている偽者の暗号を親局が復号化できず、本人と認証してくれない。

【0012】図1及び図2で暗号情報交換機能を使う親局用のアプリケーションソフトウェア(4)をインストールし、暗号情報交換機能の親局の分担機能(6)を持ち、インターネット(17)、LAN(18)、公衆電話網(19)を含むWAN(20)を経由して、親局(1)に加入接続した子局(2)と暗号情報の交信を行うパソコンもしくはワークステーション等の情報機器で構成される親局(1)と、暗号情報交換機能の子局の分担機能(8)を組み込んだ暗号情報交換機能を使う子局用のアプリケーションソフトウェア(5)をインストールし、親局(1)に加入接続したパソコンもしくは移動情報端末もしくはワークステーション等の情報機器で構

成される子局(2)と、暗号情報交換機能の利用者(3)の分担機能(8)を持ち、親局(1)に登録された利用者(3)、もしくは子局(2)にインストールされたアプリケーションソフトウェア(5)で利用者(3)の機能を代替する子局(2)と一体化した利用者(3)から成る暗号情報交換通信網を構成する。

【0013】親局(1)と子局(2)との間だけで暗号鍵もしくは暗号鍵と暗号方式(11)の交信を行い、子局(2)の間で暗号鍵もしくは暗号鍵と暗号方式(11)を直変更する様な事をしない。従って、暗号化された暗号鍵もしくは暗号鍵と暗号方式(11)は親局(1)が一元化して管理しているので、子局(2)の間で、暗号鍵の管理に関する負荷が懸からず、暗号情報を送信途中、仮に盗聴されたとしても、暗号を解読しない限り、第三者は暗号鍵もしくは暗号鍵と暗号方式(11)を知ることが出来ず、安全に配布できる。

【0014】親局(1)と子局(2)及び利用者(3)の暗号情報交換に関する分担機能は図2で、暗号情報交換機能の親局の分担機能(6)は

1. 利用者(3)からの暗号鍵もしくは暗号鍵と暗号方式(11)の発行要求、もしくはアプリケーションサービスでイベントが発生した時の発行要求、あるいはランダム、もしくは一定の設定した回数毎もしくは、ランダム、もしくは一定の間隔に設定した時間毎の発行要求を受けて、親局(1)は利用者(3)毎に単数のもしくは複数の暗号鍵もしくは暗号鍵と暗号方式(11)を生成もしくは選択する。
2. 親局暗号鍵管理データ(13)へ、利用者識別記号(9)毎に生成もしくは選択した暗号鍵もしくは暗号鍵と暗号方式(11)を更新する。
3. 利用者(3)の利用者識別記号(9)が格納されている子局(2)へ生成もしくは選択した暗号鍵もしくは暗号鍵と暗号方式(11)を配布する。
4. 利用者(3)の登録時、利用者識別記号(9)を生成し、親局暗号鍵管理データ(13)へ記録し、利用者識別記号(9)と対応を付けて利用者属性情報(10)を記録し、利用者(3)が子局(2)を通して親局(1)へ接続した子局(2)へ利用者識別記号(9)を配布し、親局(1)が登録を認めたことを利用者へ連絡する
5. 子局(2)の加入接続時、子局識別記号(12)を生成し、親局暗号鍵管理データ(13)へ記録し、子局(2)へ配布する。
6. 子局(2)の入力受付と子局(2)との通信制御
7. 暗号情報交換方式を利用したアプリケーションサービスを実行する機能
8. 暗号化された利用者識別記号(9)と利用者属性情報(10)及び子局識別記号(12)を受信し、親局暗号鍵管理データ(13)と突き合わせて利用者(3)の認証を行う。

9. 子局(2)との情報交信に際し、情報を暗号化し、複合化する。

【0014】これに対応する暗号情報交換機能の子局の分担機能機能(7)は

1. 親局(1)との通信制御
  2. 利用者識別記号(9)を格納している利用者(3)毎の暗号鍵もしくは暗号鍵と暗号方式(11)を利用者識別記号(9)毎に更新して格納する。
  3. 親局(1)が子局(2)に配布した子局識別記号(12)を格納し、子局識別記号(12)を利用者識別記号(9)と一緒に利用者属性情報(10)を親局(1)に送信する。
  4. 子局(2)は子局暗号鍵管理データ(14)に格納している単数あるいは複数の利用者識別記号(9)を確認して、利用者識別記号(9)が格納されていない利用者(3)のアプリケーションサービスへの参加を拒絶する。
  5. 子局(2)は登録している利用者属性情報(10)の一部もしくは全てを利用者(3)本人以外の第三者が見ることが出来ないように子局(2)へ格納しておき、利用者(3)が属性情報を手で入力する手間を省略する事も出来る。
  6. 利用者(3)からのパスワード(16)の変更申請を受け付けて、親局(1)へ更新情報を送信し、子局(2)が内部で格納している場合は格納しているデータの変更処理を行う。
  7. 利用者(3)が子局(2)を通して他の子局(2)もしくは親局(1)と情報交信を行う際、格納された利用者(3)毎の暗号鍵もしくは暗号鍵と暗号方式(11)を使って、情報を暗号化し、複合化する。
- 【0015】最後に暗号情報交換機能の利用者の分担機能(8)は
1. 子局(2)もしくは親局(1)を通してアプリケーションサービスで要求する利用者(3)としての属性情報(10)を入力、送信し、アプリケーションサービスで要求している手続きを行い利用者(3)として親局(1)に登録する。
  2. 子局(2)もしくは親局(1)を通して、アプリケーションサービスを実行し利便をうる。
  3. 子局(2)を通して利用者属性情報(10)の一部、もしくは全ての情報を利用者(3)が入力するが、属性情報の一部もしくは全てを子局(2)へ格納しておき操作性を楽に出来る。
  4. アプリケーションサービスによっては暗号情報交換機能を使う子局用のアプリケーションソフトウェア(5)を子局(2)にインストールし、全て、もしくは大部分の入出力機能を利用者(3)に代わって代行し、利用者(3)の入出力操作無しで子局(2)はアプリケーションサービスが実行可能となる。一般にアプリケーションサービスを提供する側の利用者(3)は子局

(2)と一体となるので、暗号情報交換機能を使う子局用のアプリケーションソフトウェア(5)が利用者(3)の機能を殆ど全て代行する。

5. 利用者(3)の記憶で管理しているパスワード(16)を随時変更する。

【0016】利用者(3)が親局(1)に登録して、本人であることの認証を得る為に子局(2)と親局(1)の間で送受信する利用者属性情報(10)として次の3つの分類で整理する。

- 1 親局(1)が生成し管理する情報
  - a 利用者識別記号(9)
  - b 子局識別記号(12)
- 2 利用者(3)の記憶で管理する情報
  - a パスワード(16)
- 3 利用者(3)の社会的な情報
  - a 氏名
  - b 住所
  - c 加入者電話番号
  - d 電子メールアドレス
  - e 免許証・保険証・戸籍抄本・印鑑証明等公に発行された本人を確認する書類に記された整理番号等
  - g 勤務先

親局(1)が生成し管理する情報は、子局(2)及び利用者(3)が親局(1)に加入接続もしくは登録時に親局(1)が生成管理する情報で、子局の識別記号(12)は子局(2)を親局(1)が識別するために使用するので、子局(2)のそれぞれに独自の記号を割り当てる。親局(1)だけが子局識別記号(12)を管理し、子局(2)に配布して、親局暗号鍵管理データ(13)及び、子局暗号鍵管理データ(14)で子局識別記号(12)を保管している。利用者識別記号(9)は利用者(3)に知らせて、親局(1)及び子局(2)で保管管理し、氏名に代わって利用される。利用者(3)の記憶で管理する情報としてパスワード(16)がある。この情報は原則として、利用者(3)がアプリケーションサービスの利用に先立って、子局(2)を通じて手で入力し親局(1)が利用者(3)の認証の為の情報として利用する。パスワード(16)は原則として、利用者(3)の記憶によってのみ保持されるが、利用性を上げるため、子局(2)の中に第三者が窺い知れないように格納する事も可能である。パスワード(16)は第三者への漏洩を防止するために、随時、子局(2)で変更手続きを行い、親局(1)もしくは子局(2)で管理している利用者(3)毎のパスワード(16)を変更する。利用者(3)の社会的な情報として、氏名や、住所等がある。これらの情報は、利用者(3)が最初親局(1)に登録する時に利用者(3)の確認をかねて登録する情報で、利用の度毎に、逐一、この情報を利用者(3)が手で入力するのは手間を要するのでこれらの情報のいくつかもしくは全てを子局(2)に登録して利用する事も

できる。しかし、積極的に第三者に開示する情報ではないので、利用者(3)本人以外の人アクセス出来ないようにして格納する。

【0017】暗号鍵もしくは暗号鍵と暗号方式(11)の生成と配布、管理

親局(1)が暗号鍵もしくは暗号鍵と暗号方式(11)を何時生成もしくは選択して配布し、何時更新するのかはアプリケーションサービスによって異なってくる。基本的には親局(1)と子局(2)との間で鍵の生成、配布、更新に関する情報コマンドが送信されて親局(1)と子局(2)の間で、互いに一致した暗号鍵もしくは暗号鍵と暗号方式(11)を記録、格納している。鍵を管理する情報コマンドとして下記のコマンドがある。

1. 鍵の生成と配布要求
2. 鍵の受信報告
3. 鍵の更新要求
4. 鍵の更新通達
5. 鍵の更新報告

鍵の生成配布要求は、利用者(3)もしくは親局(1)のアプリケーションサービスから必要な時コマンドが発行される。鍵の更新通達は、管理の簡便さ、管理の必要上、図3で複数個の暗号鍵もしくは暗号鍵と暗号方式(11)を一度に子局(2)に配布しておき、特定の利用回数もしくは特定の時間間隔もしくは特定の時間もしくは特定のアプリケーションサービスを実行した後等の、親局(1)と子局(2)間の共通の認識である鍵を管理する情報(15)で、子局(2)が暗号鍵もしくは暗号鍵と暗号方式(11)を変更した結果を報告する。この場合、親局(1)と子局(2)が常に共通の状況把握ができる状態の場合は子局(2)が鍵を変更すると同じく、親局(1)が鍵の情報を更新できる。しかし、子局(2)の通達を受けるまで親局(1)が状況を把握できない場合、子局(2)は、更新が完了するまで、利用を保留しなければならない。例えば、子局(2)は現在使っている暗号鍵もしくは暗号鍵と暗号方式(11)を設定した利用回数毎に使い捨て、次の暗号鍵もしくは暗号鍵と暗号方式(11)に更新する場合、親局(1)と子局(2)の間で、利用回数に関する共通の概念が確認されていても、何回子局(2)で利用されたか子局(2)でないと状況の把握はできない場合、子局(2)で判断して暗号鍵もしくは暗号鍵と暗号方式(11)を更新して、親局(1)へ鍵の更新通達を発行する。

【0018】この発明で使用する暗号方式と暗号鍵は、既に世の中で研究された、共通鍵方式の暗号方式のいずれかを採用する。どのような暗号方式を選択するかは、アプリケーションサービスの特性もしくは事業性に合わせて選択する。

【0019】この発明に於いて、暗号鍵もしくは暗号鍵と暗号方式(11)の配布経路は、N人の参加者がある情報通信網の中で、(図4(a))で子局(2)が相互

に鍵を配布する場合の配布経路は $N * (N - 1) / 2$ であるが、親局(1)と子局(2)の間だけの鍵配布経路は(図4(b))でNとなり、暗号鍵の配布経路は任意の相手に配布するのに比較して $(N - 1) / 2$ 倍だけ減少出来る。更に、(図4(c))でK個の親局(1)を子局(2)と見なして新たな親局(1)を設け、今までの親局(1)を子局(2)として管理させる階層構造を持つ暗号情報交換網を設定すると、管理のスパンはNとKに減少し、暗号鍵もしくは暗号鍵と暗号方式(11)の配布経路と配布の管理工数は大幅に簡素化される。

【0020】子局(2)の登録と利用者(3)の登録  
親局(1)が利用者(3)の登録を受け付ける時、利用者(3)が本人であることの確認は極めて重要である。ここでは、親局(1)、子局(2)、利用者(3)の間で、どのような情報の送信が行われるのか、また、どのような順序で情報が記録されるかを図(5)で示す。

1. 最初に子局(2)からアプリケーションプログラムのダウンロード要求を親局(1)が受け付ける。親局(1)は、受付日時、ダウンロードするプログラムの管理番号、暗号鍵もしくは暗号鍵と暗号方式(11)、子局(2)のIP Addressを確認情報として記録できる。インターネットのIP Addressは一般に子局(2)に1対1に対応していないが、あるバンド幅の値を示したり、絶えず移動したり、固定した値だったり、ある特性を示すことを期待して記録する。

2. ダウンロードしたプログラム(5)を子局(2)にインストールし、子局(2)にプログラム固有の管理番号、暗号鍵もしくは暗号鍵と暗号方式(11)が設定される。

3. 利用者(3)は親局が指定する利用者属性情報(10)を子局(2)を通して入力し、子局(2)の管理番号と共に親局(1)に送信する。

4. 親局(1)は管理番号で暗号鍵もしくは暗号鍵と暗号方式(11)を確認し、新たに登録の日時、利用者属性情報(10)を記録し、子局識別記号(12)及び、利用者識別記号(9)及び初期パスワード(16)を生成し、記録する。

5. 子局識別記号(12)及び利用者識別記号(9)及び初期パスワード(16)を暗号化して子局(2)へ送信する。

6. 子局(2)は暗号化された子局識別記号(12)及び、利用者識別記号(9)及び初期パスワード(16)を復号化して、子局(2)に更新して格納する。

7. 利用者(3)は、利用者識別記号(9)及び初期パスワード(16)を確認する。

8. 利用者(3)はパスワード(16)の変更手続きを子局(2)を通して行い、親局(1)は変更を受け付け、記録を更新する。

9. 利用者(3)は利用者識別記号(9)、パスワード(16)を含む利用者属性情報(10)を子局(2)を



通して入力し、子局(2)は子局の識別記(12)と共に親局(1)に送信する。

10. 親局(1)は、利用者の識別記号(9)に対応したパスワード(16)を含む利用者属性情報(10)及び子局識別記号(12)を記録する。

11. 通信網を介した情報だけで本人であることを確認するのは難しく、利用者の社会的な情報を示す、免許証、健康保険証、戸籍抄本等アプリケーションが指定する書類、又はそのコピーの送付を求め、既に送信された情報との確認を行い、書類を保管する。これで利用者(3)は子局(2)を経由して、親局(1)に登録される。

12. 親局(1)は利用者識別記号(9)並びに親局(1)の特徴を示す住所や電話番号、URL、ロゴマーク等を明示するカードを発行する。このカードは利用者(3)にトラブル時の連絡や、親局(1)を偽って働きかける場合の防止と親局(1)の宣伝を兼ねている。

【0021】ダウンロードされたプログラムは一つの子局(2)だけで使用されるとは限らず、コピーされて、複数の子局(2)で利用される可能性が高いが、複数の子局(2)で利用されても、利用者(3)の登録時に暗号鍵もしくは暗号鍵と暗号方式(11)が変更され問題にならない。一つの子局(2)で複数の利用者(3)が登録しても、複数の利用者識別記号(9)と、利用者識別記号(9)に対応した暗号鍵もしくは暗号鍵と暗号方式(11)が親局(1)及び子局(2)に設定される。従って、一つの子局(2)を通じて、複数の利用者(3)がアプリケーションのサービスを利用できる。

【0022】複数の子局(2)を経由して利用者(3)がサービスを利用する場合。利用者(3)が一つの子局(2)経由でサービスを利用するだけでなく、モバイルの子局(2)や、別の場所にある子局(2)を通して、サービスを利用したい場合、登録した利用者(3)が本人か否か最初の登録と同じように本人を証明する社会的な情報の提出を受けて行う方法もあるが、利用者(3)にとって煩わしい。この不便を解消する通信網上での登録行為を図6に示す。

① 既に子局(2)Aを通して、親局(1)に登録している利用者(3)aが子局(2)Bを経由して、利用者識別記号(9)とパスワード(16)を含むアプリケーションサービスが要求する利用者aの属性情報(10)を入力して複数個の登録申請手続きを親局(1)に行う。

② 親局(1)はこの手続きを受け付け、子局識別番号(12)が子局(2)B経由で来たこと、及び利用者(3)aが登録要求してきた事を既に登録済みの情報と突き合わせ確認し、記録する。

③ 利用者(3)aは既に登録されている子局(2)A経由で認証手続きを行う。

④ 親局(1)は利用者(3)aが子局(2)Aから受

け取った認証依頼を確認して本人を認証する。

⑤ 親局(1)は、子局(2)Bに利用者(3)aの新しく生成した暗号鍵もしくは暗号鍵と暗号方式(11)を配布し、親局暗号管理データ(13)を更新する。

⑥ 子局(2)Bは配布された暗号鍵もしくは暗号鍵と暗号方式(11)で利用者(3)aの利用者識別記号(9)対応した記録を作成する。この手続きが済んだ後、利用者(3)aは子局(2)Aもしくは子局(2)Bを経由してアプリケーションのサービスを利用できる。ここでは、子局(2)Bが既に子局として接続済みであるとして説明したが、子局(2)Bが未だ加入接続されていない場合は、子局(2)の加入接続手続きを行えば既に接続した場合と同じ扱いとなる。

【0023】システムが破壊した場合の再登録方法  
子局(2)のシステムが壊れる事がある。この場合の再登録は、利用者識別記号(9)と、パスワード(16)、利用者属性情報(10)を親局(1)が受信して、本人であると思えず方法もあるが、利用者識別記号(9)、パスワード(16)を含む全ての利用者属性情報(10)を盗まれた場合、別の子局(2)を通して親局(1)に加入接続し、本人に成りすます事が出来る。従って、社会的な情報を親局(1)に文書等で送付し、本人の確認をやり直す事になる。アプリケーションサービスを実行途中で、システムが一部破壊した場合、アプリケーションサービスの実行を破棄するか、文書等の別の手段で対策するか、もしくは、システムを復旧し、最初から登録をやり直して、アプリケーションサービスを実行する事になる。

【0024】利用者の暗号鍵もしくは暗号鍵と暗号方式(11)を親局(1)が管理しているとしても、子局(2)に記録された利用者の暗号鍵もしくは暗号鍵と暗号方式(11)と親局(1)に記録された利用者の暗号鍵もしくは暗号鍵と暗号方式(11)の持ち方の関係を明確にしておく必要がある。

【0025】襷掛け配布

図7に親局(1)で記録している利用者の暗号鍵もしくは暗号鍵と暗号方式(11)と子局(2)で記録している暗号鍵もしくは暗号鍵と暗号方式(11)との間の依存関係を示す。既に子局(2)に格納された利用者(3)の暗号鍵もしくは暗号鍵と暗号方式(11)を暗号鍵 $k-1$ 、暗号方式 $k-1$ とすると、新たに親局(1)が子局(2)に配布する暗号鍵もしくは暗号鍵と暗号方式(11)は、既に子局(2)に格納された暗号鍵 $k-1$ 、暗号方式 $k-1$ で暗号化して子局(2)に送信し、子局(2)はそれを復号化して暗号鍵 $k$ 、暗号方式 $k$ へ更新する。これ以降、新しい鍵の配布を受けるまでの間、子局(2)を通じて送受信される情報は暗号鍵 $k$ 、暗号方式 $k$ で暗号化、復号化される。暗号鍵もしくは暗号鍵と暗号方式(11)と同時に暗号情報を受信した場合、その暗号は既に登録されている暗号鍵 $k-1$ 、

暗号方式 $k-1$ で復号化する。このように、既に送信済みの暗号鍵もしくは暗号鍵と暗号方式(11)を使って暗号化と復号化を行うので、棒掛けの暗号鍵もしくは暗号鍵と暗号方式(11)の利用形態となる。親局(1)と子局(2)の間で、暗号鍵もしくは暗号鍵と暗号方式(11)の棒掛けに利用できる関係は、鍵の配布と暗号情報の交信に時間的なずれが生じセキュリティ確保上、有利に働く。

#### 【0026】暗号鍵の平行配信方式

図8に親局(1)が暗号化した暗号鍵もしくは暗号鍵と暗号方式(11)を子局(2)に配布し、配布された暗号を子局(2)の中で復号化して、暗号鍵もしくは暗号鍵と暗号方式(11)を子局(2)の中に格納する。前に配布済みの暗号鍵もしくは暗号鍵と暗号方式(11)を使用せず配布した暗号鍵もしくは暗号鍵と暗号方式(11)で情報を暗号化、復号化する。

【0027】親局(1)と子局(2)及び利用者(3)から成る暗号情報交換方式を利用する情報交換の方式は、次の3つの形式を設定する。

1 親局(1)が利用者(3)の情報を中継して情報の交換を行う。

2 利用者(3)間で直接情報の交換を行う。

3 親局(1)と利用者(3)間で情報の交換を行う。利用者(3)である事を確認した後、更新する情報は、平文を暗号化して情報の交信を行う場合と、平文の儘交信を行う場合とがある。情報交信として、トラブル時の情報交換など、管理上発生する情報の交換はアプリケーションサービスの実行を支えるために、目的とする情報交換以外にも発生するが、ここでは利用者(3)がアプリケーションサービスを利用する上で行う情報交換についてのみ説明する。

【0028】中継情報交換：図9に親局(1)が子局(2)Aと子局(2)Bとの間で情報を取り次いで子局(2)A、B間で情報の中継交信を行う場合を示す。利用者(3)aの暗号鍵もしくは暗号鍵と暗号方式(11)で暗号化した送達情報と送信先の利用者(3)の宛先を親局(1)宛に送信する。受信した親局(1)は暗号を復号化して、子局(2)Bの利用者(3)bの暗号鍵もしくは暗号鍵と暗号方式(11)で送達情報を暗号化して、利用者(3)bが登録されている子局(2)B宛に送信する。子局(2)Bで受信した利用者(3)bは情報を復号化して、受信情報の内容を理解する。子局(2)Aと子局(2)B間で直接情報の送受信を行わず、親局(1)を中継して間接的に情報の交信を行う。

【0029】中継情報交換の場合、親局(1)で情報の暗号化、復号化の中継作業を行うため、手間を要するが、そのために得られる利点もある。

1 間接的な情報取引の為に、利用者(3)aの利用者属性情報(10)は親局(1)で確認するとどめ、用件に関する情報だけを利用者(3)bに伝える事で、匿

名の情報伝達が可能となる。

2 親局(1)が子局(2)A、B間の中継情報交換を行う場合、図10の利用者(3)aの情報を親局(1)が受信するタイミングと、利用者(3)bの情報を受信するタイミングが一致しない場合、アプリケーションサービスの処理を一時保留し、双方の情報が揃ってからアプリケーションサービスの処理を実行する。

【0030】利用者(3)間で直接情報の交信を行う場合：親局(1)を介さずに直接子局(2)間で暗号情報を交信したい場合、図11で子局(2)Aを通じて利用者(3)aは利用者(3)bとの直接交信要求と、暗号鍵もしくは暗号鍵と暗号方式(11)もしくはそれに代わる確認用の暗号確認情報(23)の配布依頼をする。親局(1)は、利用者(3)a、及び利用者(3)b共通の暗号鍵もしくは暗号鍵と暗号方式(11)もしくはそれに代わる暗号確認情報(23)を生成もしくは選択し子局(2)A及び、子局(2)Bへ配布する。双方の子局(2)で復号化した暗号鍵もしくは暗号鍵と暗号方式(11)もしくはそれに代わる暗号確認情報(23)を格納し利用者(3)a、b間で暗号情報を送受信し、復号化して内容を確認し、情報の交信を行う。

【0031】利用者(3)で情報の送信元と受信元の間で暗号情報の送受信が行われる場合、送信元利用者(3)から単数もしくは複数の送信先利用者(3)へ暗号鍵もしくは暗号鍵と暗号方式(11)の配布要求が親局(1)へなされ、親局(1)は、送信先の利用者(3)の暗号鍵もしくは暗号鍵と暗号方式(11)を送信元の利用者(3)の利用者識別記号(9)が格納されている子局(2)へ送信し、送信元の利用者の識別記号(9)は情報を暗号化して、送信先へ送信し、送信先の利用者(3)が暗号を複合化して情報交信がなされる。

【0032】親局(1)と利用者(3)間で情報の交信を行う：利用者(3)が子局(2)を通じて直接親局(1)との間で情報の交信を行う場合もある。図12で利用者(3)のA1は子局(2)Aを通して、親局(1)と直接情報の交信を行う。

#### 【0033】

##### 【実施例】

デリバリー取引

図13に通信網を介して商品の配送を行う商品売買取引システムの例を示す。親局(1)は購買者からの注文を販売者に取次ぎ、売買が合意されると取引の決済を行う。子局(2)の購買者は購入する商品の注文を行い、子局(2)の販売者は注文を承けて、商品を直接発送先へ発送する。親局(1)の取引取次・決済機関に加入接続した複数の子局に登録した購買者と複数の子局に登録した販売者は商取引通信網を構成する。親局(1)が利用者(3)の情報を中継して情報の交換を行う場合の実施例に当たる。図13で取引の手続きを追うと、  
①購買者の取引開始依頼を利用者識別記号(9)及び利

用者属性情報(10)及び子局識別記号(12)と一緒に中継取次・決済機関に送信し、中継取次・決済機関はこれを復号化する。利用者識別記号(9)及び利用者属性情報(10)及び子局識別記号(12)で購買者を確認する。

②中継取次・決済機関は取引番号と購買者の暗号鍵もしくは暗号鍵と暗号方式(11)を生成し購買者に配布する。受信した購買者は子局(2)で暗号鍵もしくは暗号鍵と暗号方式(11)が更新される。

③購買者は販売者の子局(2)のURL(Universal Resource Locator)と購入したい商品情報、及び購買者の属性情報を暗号化して中継取次・決済機関に送信する。中継取次・決済機関は暗号を復号化して、購買者の認証を行い、与信を確認する。

④販売者の暗号鍵もしくは暗号鍵と暗号方式(11)で購買者の購買仕様を暗号化して、販売者の子局(2)に送信する。このとき、商品の取引に関わる情報だけを販売者に中継して送信するので、購買者は匿名で商品の購入が出来る。販売者の暗号鍵もしくは暗号鍵と暗号方式(11)は親局(1)の中継取次・決済機関が任意の考え方で生成・配布して変更する。例えば設定した取引回数、もしくは設定した時間間隔等の更新が考えられる。

⑤販売者は注文の仕様を確認し、中継取次・決済機関に受注連絡を商品の発送予定日と一緒に送信する。中継取次・決済機関は暗号を復号化し、注文と一致しているか否か確認し、内部決済処理を行う。

⑥中継取次・決済機関は売買成立と発送予定日を購買者に送信する。

⑦販売者から商品の発送連絡が中継取次・決済機関に送信されると、中継取次・決済機関は購買者及び販売者の間で取引の決済を行う。

商品の引き渡しを伴う取引を通信網で行う場合の決済は中継取次・決済機関を中継する事で、販売者から商品発送の情報を受けた後、決済を行うので相対取引と同じタイミングで決済が可能となり店頭で商品を現品で受け取って代金を支払うのと同じ様な相対取引決済ができ、購買者と販売者の間の取引に伴う商品を送ったが、お金が回収できないとか、お金を送ったが商品が発送されないとか言うリスクを軽減できる。

#### 【0034】情報サービス

図14にデータ提供等のサービス取引を通信網を用いて行う場合を示す。

①サービス利用者はサービス提供者の子局(2)のURL(Universal Resource Locator)とサービス利用者属性情報(10)を暗号化して、サービス利用請求をサービス仲介機関に送信する。サービス仲介機関は暗号を復号化し、サービス利用者の認証と、信用の確認を行う。

②サービス仲介機関は暗号鍵もしくは暗号鍵と暗号方式

(11)を生成もしくは選択し、更にサービス利用者サービス提供者共通の取引番号を生成し、サービス利用者にサービス提供者の暗号鍵もしくは暗号鍵と暗号方式(11)で暗号化した取引番号とサービス利用者の暗号鍵もしくは暗号鍵と暗号方式(11)を暗号化して送信し、サービス提供者に取引番号を暗号化して送信する。暗号化された取引番号は暗号確認情報(23)を示す。サービス利用者は送信された取引番号及び暗号鍵もしくは暗号鍵と暗号方式(11)を格納する。

③サービス利用者はサービス提供者に取引番号を送信し、サービス提供者が暗号化された取引番号を復号化して確認する。

④サービス利用者はサービス提供者からデータサービスを直接受ける。

⑤サービス料金は、サービス提供者からサービス仲介機関に料金請求がなされて、サービス仲介機関もしくは決済機関が決済を行う。

決済引き落としを承諾したサービス利用者と、サービス提供者が、直接、サービス利用に関する決済の問題を処理しなくても、サービス仲介機関を介する事で、小口の費用の決済が可能で簡単にサービスが受けられる。

【0035】図15に暗号情報交換方式を利用したホームバンキングを示す。金融機関Cに預金口座を開設した口座開設者は、子局(2)を通じて金融機関Cから配布された暗号鍵もしくは暗号鍵と暗号方式(11)で、利用者識別記号(9)及び利用者属性情報(10)及び子局識別記号(12)と、振り込み情報と一緒に暗号化して親局(1)の金融機関に送信し、親局(1)の金融機関で復号化して、口座開設者を認証し、同じ金融機関Cの他の口座開設者もしくは他の金融機関Dの口座開設者に送金処理が行われる。

#### 【0036】親書の配送

図16に電子情報管理機構による親書の確実な配達を行うシステムを示す。電子情報管理機構にメール送受信者は登録した子局(2)を通じてメールアドレス毎にパスワード(16)を随時設定する。設定されたパスワード(16)は、電子情報管理機構に送信される。

①発信者aが子局(2)を通じて電子情報管理機構に送信先のメールアドレスを暗号化して送信し、親書の送信要求を行う。

②電子情報管理機構は子局(2)Aの発信者aに受信者bの暗号鍵もしくは暗号鍵と暗号方式(11)を暗号化して送信する。

③発信者aは親書を暗号化して、受信者bに送信する。

④受信者bの復号化が成功すると、子局(2)Bは受信復号化確認情報を電子情報管理機構に送信し、設定された暗号鍵もしくは暗号鍵と暗号方式(11)で受信できる回数のカウンターを一つ減ずる。カウンターの値が設定された値に達すると、その暗号鍵もしくは暗号鍵と暗号方式(11)は図16でefgからhijへ更新され

e f gは消去される。

⑤電子情報管理機構から子局(2)の発信者に送達連絡を行う。電子情報管理機構は、あらかじめ、メールアドレス毎に複数の暗号鍵もしくは暗号鍵と暗号方式(11)を配布し、設定された回数だけ受信者が子局(2)で親書を受信すると、その暗号鍵もしくは暗号鍵と暗号方式(10)は子局(2)から消去される。発信者aと受信者bとの間で暗号化された親書が届けられた事を電子情報管理機構を経由して連絡し、親書の送達が確認できる。

#### 【0037】イントラネット

図17に企業内でのイントラネットの情報管理の例を示す。LAN(18)に接続された子局(2)<sub>11</sub>・子局(2)<sub>1k</sub>とインターネットを介して接続された子局(2)<sub>21</sub>・子局(2)<sub>2j</sub>及び、リモートアクセスで接続された子局(2)<sub>jp</sub>から成るWAN(20)を経由して接続されたイントラネットで、サーバにアクセスする情報をファイアウォール(22)で防御するだけでなく、親局(1)のサーバが接続された子局(2)に生成し配布する暗号鍵もしくは暗号鍵と暗号方式(11)を利用することによって、親局(1)のサーバを経由する全ての情報のセキュリティが保てるシステムが構築出来る。ファイアウォール(22)で外部からの情報に対するセキュリティを強化しても、組織が大きくなると、ファイアウォールの内部でのセキュリティを如何に確保するかが大きな課題であるが、使い捨て暗号鍵(Throw Away Encryptical key)の管理方式はこの問題を解決してくれる。

【0038】図18で共通の暗号鍵もしくは暗号鍵と暗号方式(11)を使用する場合を示す。親局(1)から配布された共通の暗号鍵もしくは暗号鍵と暗号方式(11)を子局a、子局b、子局cが共有し、情報に関係者だけで交信できる。暗号鍵もしくは暗号鍵と暗号方式(11)の更新はアプリケーションサービスによって設定されるし、メンバーの変更に柔軟に対応できる。掲示板を共通の暗号鍵もしくは暗号鍵と暗号方式(11)を使う場合も、関係者の認証がパスワード(16)のみに比較してセキュリティ機能が強く、問題を制限して討論する場合などに利用できる。

#### 【0039】

【発明の効果】任意の交信相手全ての人に暗号鍵を安全に渡すために、公開鍵、秘密鍵方式が実行されているが、親局と子局の関係で電子情報網を構築して親局と子局及び登録された利用者の間だけで暗号情報の交換を行う事で目的が達成される場合、親局が全ての情報を管理するために、使い捨て暗号鍵(Throw Away Encryptical key)で管理すれば、利用者は暗号鍵(Throw Away Encryptical key)の存在さえ意識せず、セキュリティの個人での管理が簡便になる。

【0040】一方、WANを経由した外部からの犯罪行為に対して、ファイアウォールで外部からのアクセスを制限し、セキュリティを確保している。しかし、組織が大きくなると外部からの不正な情報アクセスに対する防御だけでなく、内部での情報網のセキュリティの重要性が高まってくるが、ファイアウォールでは防御できない。One Time Pass Wordは内部の情報通信網でも本人の認証(Authentication)に関して効果があるが、情報の機密性に対応出来ない。使い捨て暗号鍵(Throw Away Encryptical key)を使った暗号情報交換方式はイントラネット等で、内外のアクセスを問わずセキュリティが確保できる。

【0041】インターネットは本来クライアントサーバシステムで構成されているので、親局と子局の関係で情報通信網の利用システムを構成できる場合が多く、使い捨て暗号鍵(Throw Away Encryptical key)と暗号方式を使った、暗号情報の交換方式は幅広い分野での使い方が期待できる。

【0042】親局(1)と子局(2)及び利用者(3)の関係の間で管理する使い捨て暗号鍵(Throw Away Encryptical key)の暗号情報交換方式を使用して、専用回線を使ったプライベート網とほぼ同等以上のセキュリティを保ちながら、利用者は暗号鍵もしくは暗号鍵と暗号方式の内容を知らなくても、オープンで安価なインターネットや、公衆電話網を利用して、安全なプライベート網を構築出来る。

#### 【図面の簡単な説明】

【図1】利用者と子局と親局から成る情報通信網で、使い捨て暗号鍵(Throw Away Encryptical key)で情報を管理するシステム構成

【図2】利用者、子局、親局の間で、暗号情報交換を行う機能の分担

【図3】鍵を管理する情報で、複数個用意した暗号鍵もしくは暗号鍵と暗号方式の更新を行う方式

【図4】(a) N人の間で暗号鍵を渡す経路の数

(b) 親局と子局の関係を構成し、N人の間で暗号鍵を渡す経路の数

(c) 親局と子局の関係を構成し、更に親局を子局としてその上に親局を構成し、階層的な親局と子局を構成したときの暗号鍵の経路の数

【図5】利用者が子局を通して親局へ登録する方式

【図6】利用者が通信網の情報交信だけで複数の子局を通して親局へ登録する

【図7】親局と子局の間でたすき掛けで生成する使い捨て暗号鍵(Throw Away Encryptical key)の管理方式

【図8】親局から子局へ送信した暗号鍵もしくは暗号鍵と暗号方式で、暗号化に使用する使い捨て暗号鍵(Throw Away Encryptical key)

の管理方式

【図 9】親局を中継して、子局の間で暗号化した情報の送受信を行う暗号情報交換方式

【図 10】親局が子局間の情報が揃うのを待って、子局間に関わる情報処理を行うアプリケーションサービスシステム。

【図 11】親局が子局間共通の暗号鍵もしくは暗号鍵と暗号方式を生成もしくは選択して配布する暗号情報交換方式

【図 12】使い捨て暗号鍵 (Throw Away Encrypted key) で親局と子局が直接暗号情報の交信を行うシステム

【図 13】使い捨て暗号鍵 (Throw Away Encrypted key) を使って商品の配送を伴う通信網上での商取引システム

【図 14】使い捨て暗号鍵 (Throw Away Encrypted key) を使って情報サービスを行うシステム

【図 15】口座開設者が金融機関との間でオープンなネットワークを介してホームバンキングを行うシステム。

【図 16】使い捨て暗号鍵 (Throw Away Encrypted key) を使って親書の配送を行うシステム

【図 17】使い捨て暗号鍵 (Throw Away Encrypted key) を使って LAN、WAN を介したイントラネットでファイアウォールの内外を問わず、セキュリティの高い情報交信を可能とするシステム

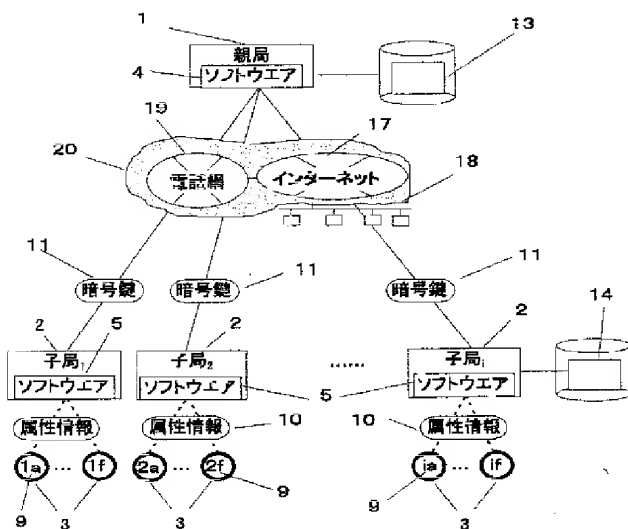
【図 18】共通の暗号鍵もしくは暗号鍵と暗号方式を使

った情報交換方式

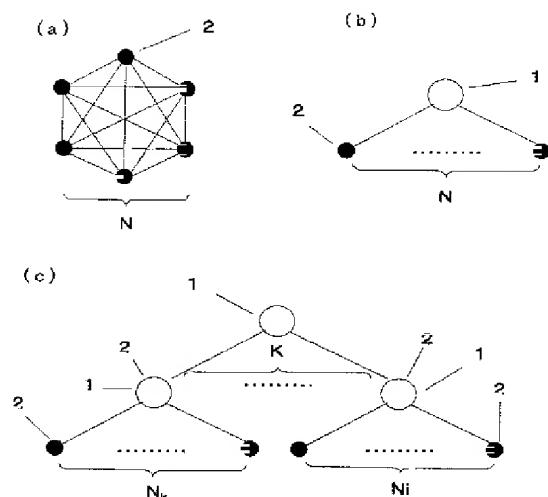
【符号の説明】

1. 親局
2. 子局
3. 利用者
4. 暗号情報交換機能を使う親局用のアプリケーションソフトウェア
5. 暗号情報交換機能を使う子局用のアプリケーションソフトウェア
6. 暗号情報交換機能の親局の分担機能
7. 暗号情報交換機能の子局の分担機能
8. 暗号情報交換機能の利用者の分担機能
9. 利用者識別記号
10. 利用者属性情報
11. 暗号鍵もしくは暗号鍵と暗号方式
12. 子局識別記号
13. 親局暗号鍵管理データ
14. 子局暗号鍵管理データ
15. 鍵を更新管理する情報
16. パスワード
17. インターネット
18. LAN (Local Area network)
19. 公衆電話網
20. WAN (Wide Area network)
21. 情報 packets
22. ファイアウォール
23. 暗号確認情報

【図 1】

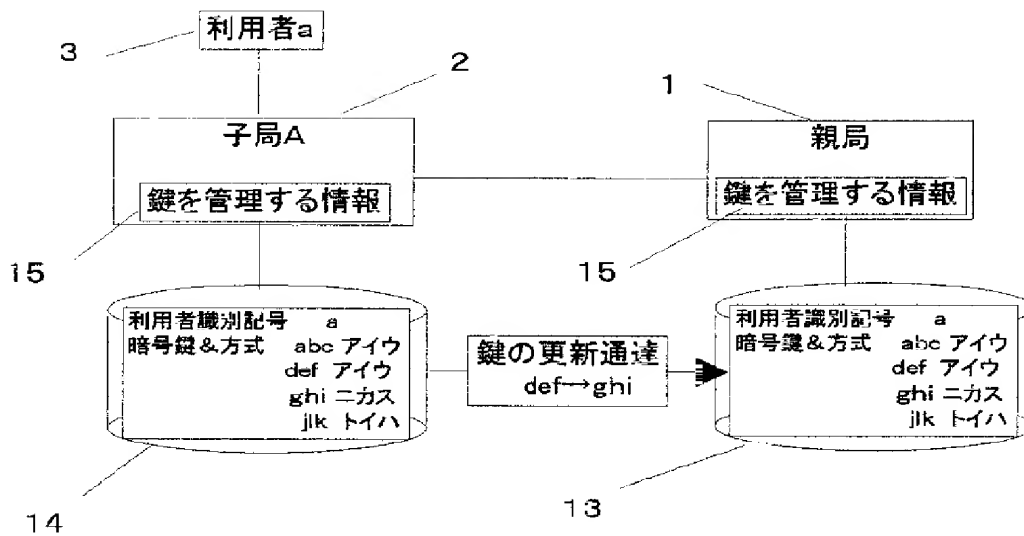


【図 4】

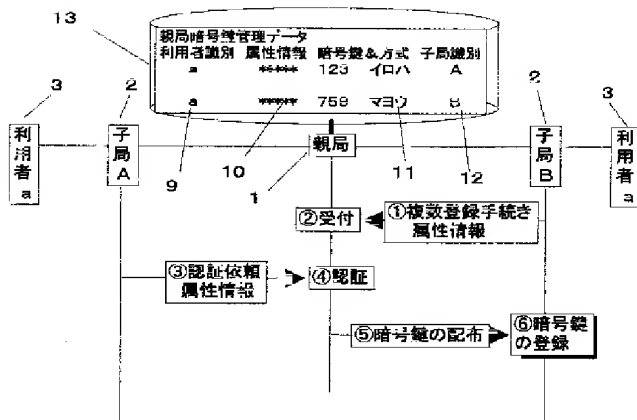




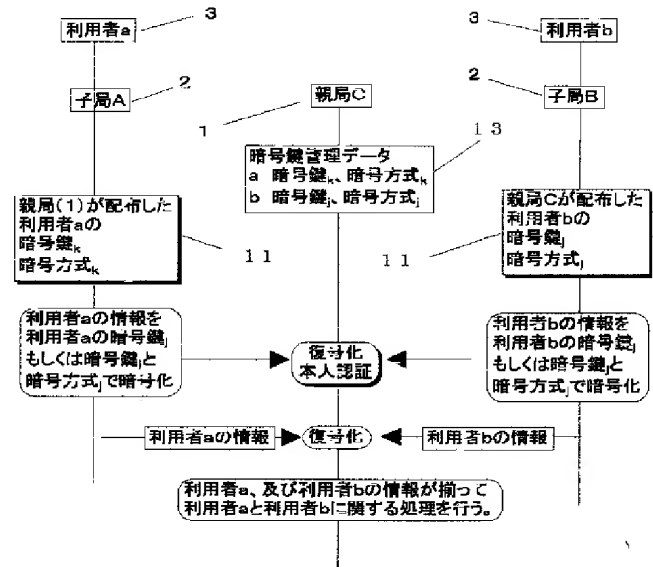
【図3】



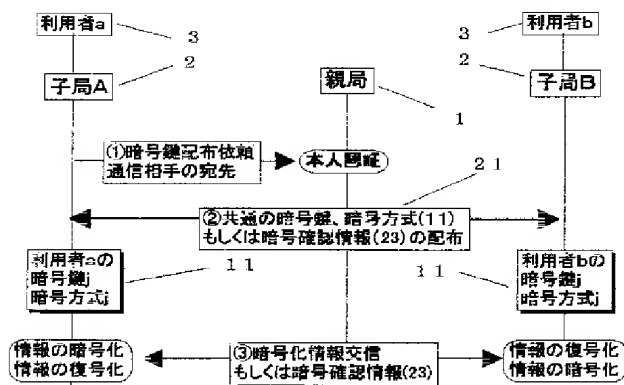
【図6】



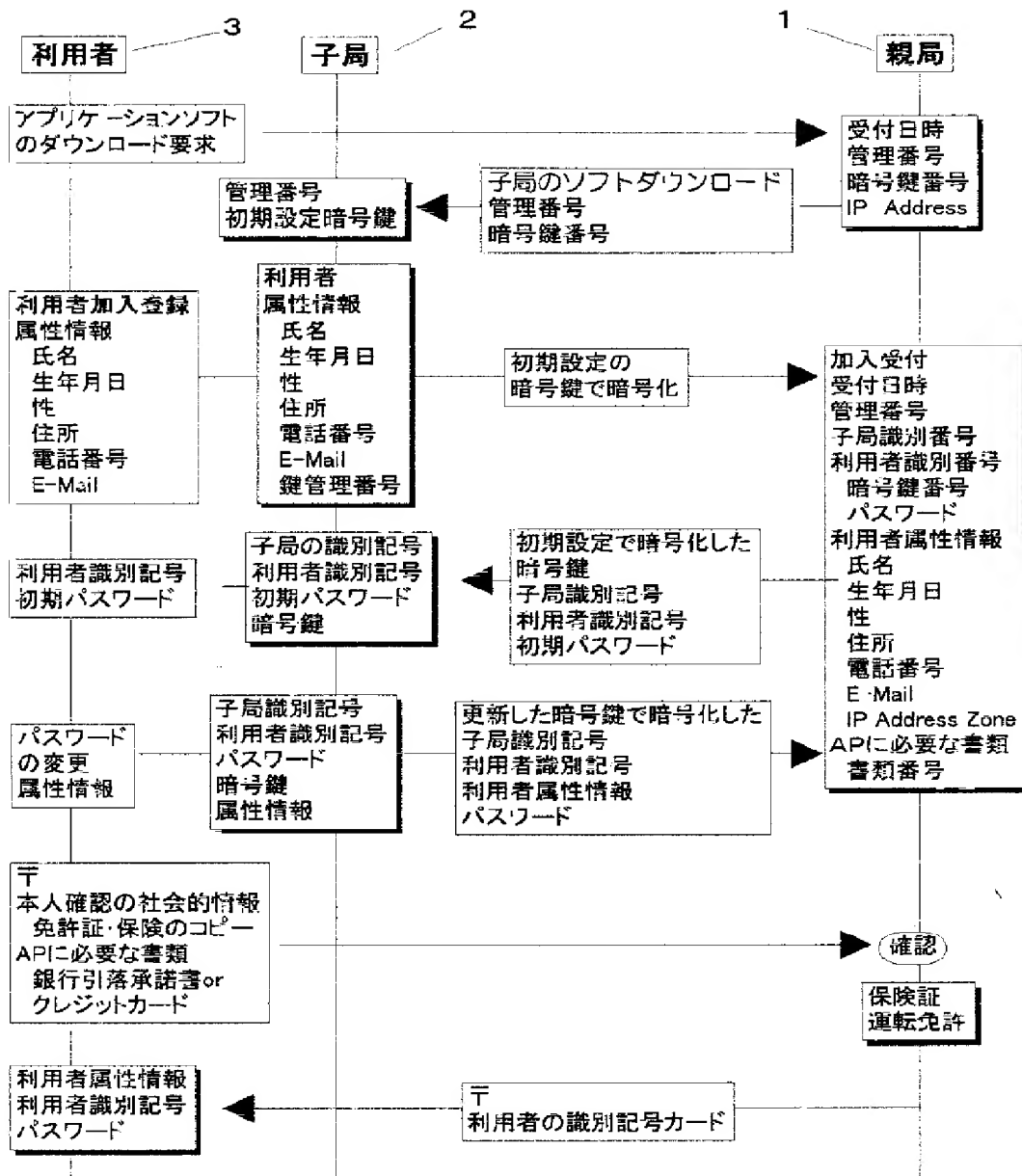
【図10】



【図11】

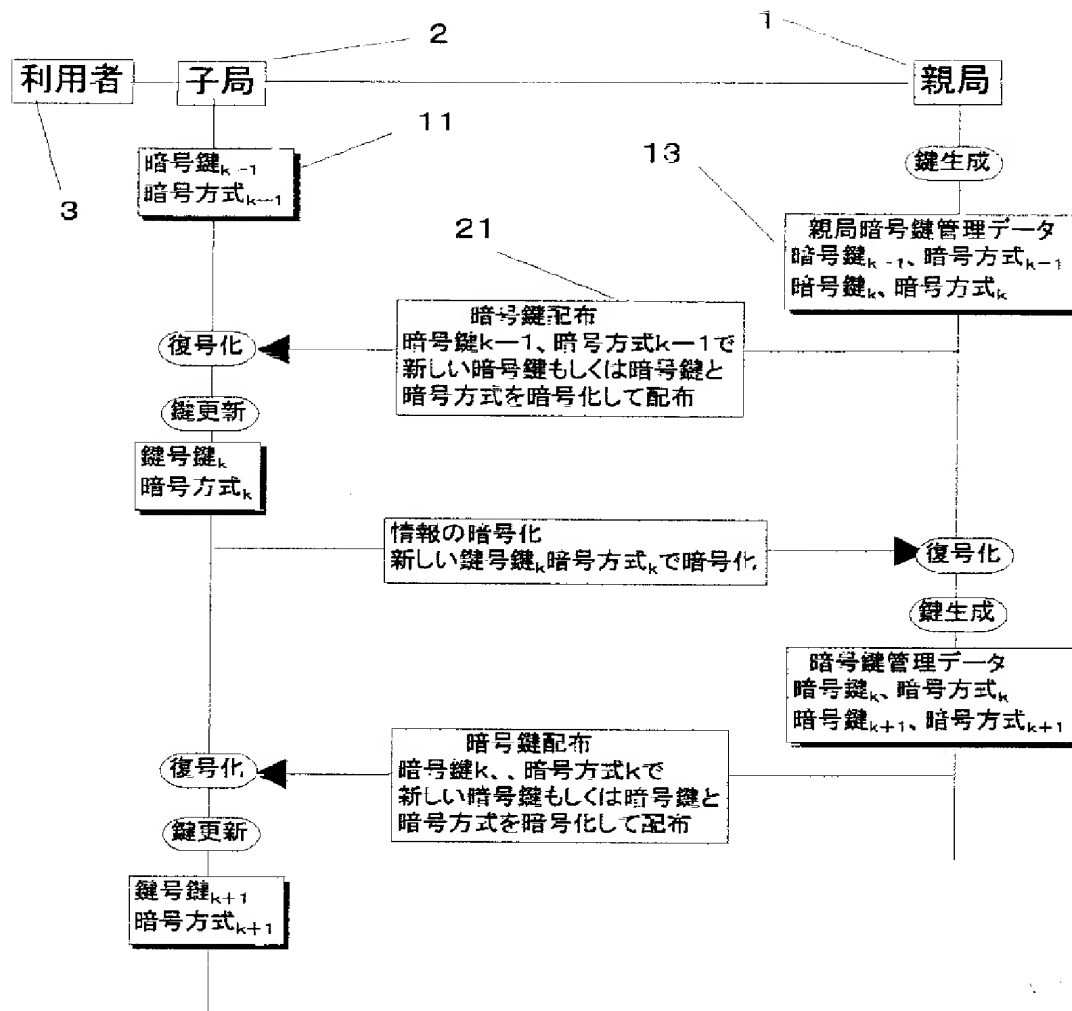


【図5】

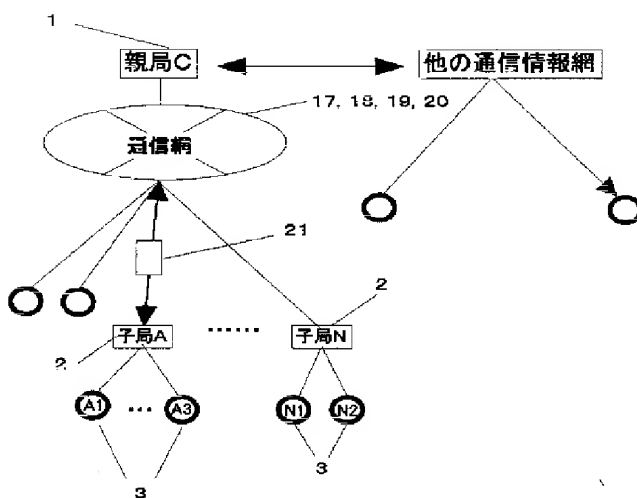




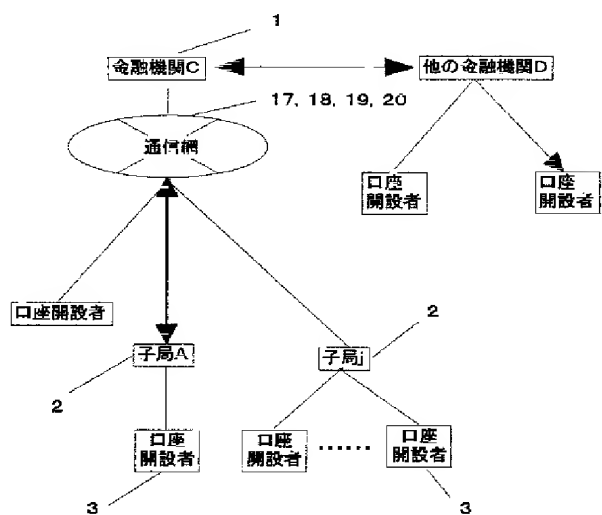
【図7】



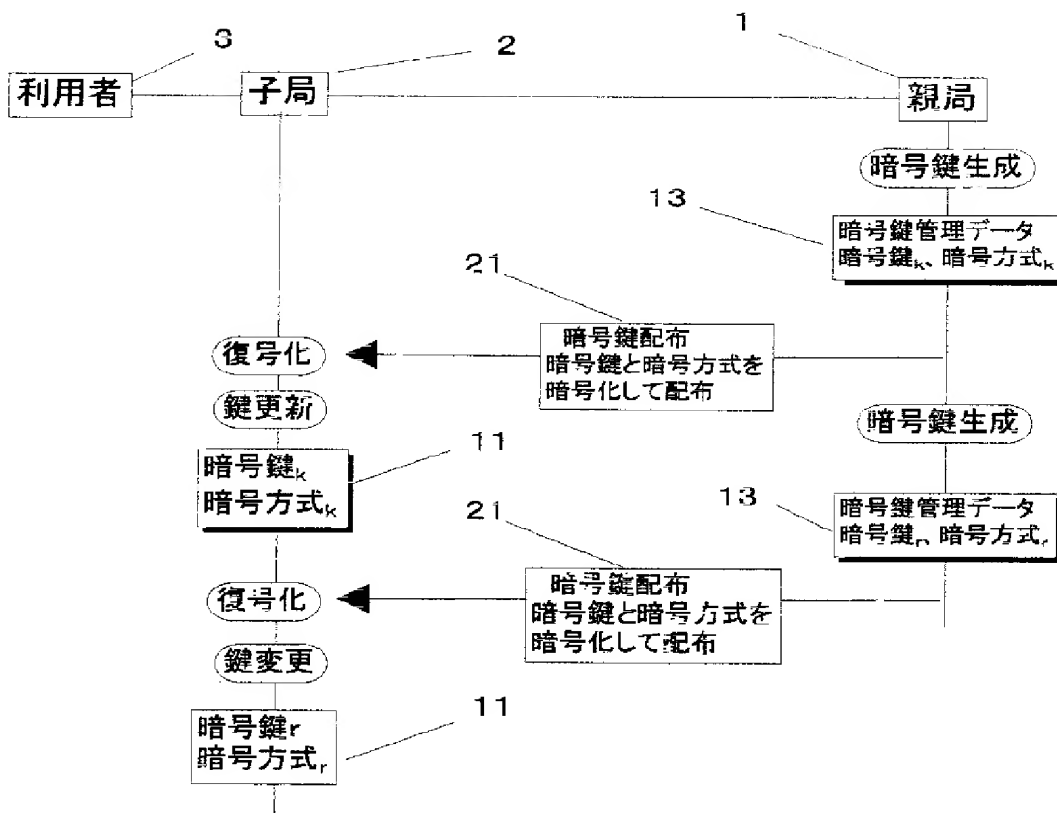
【図12】



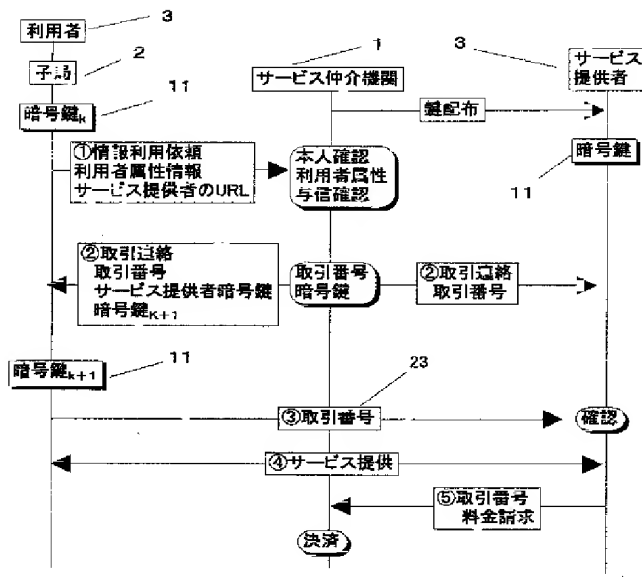
【図15】



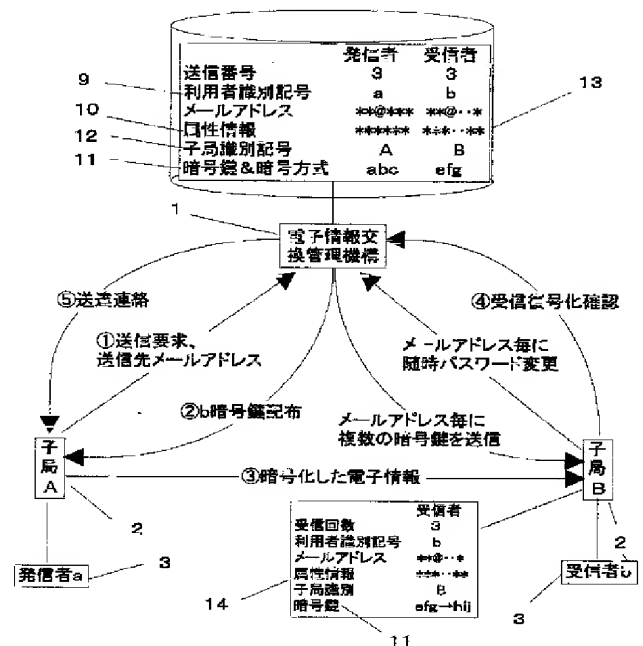
【例8】



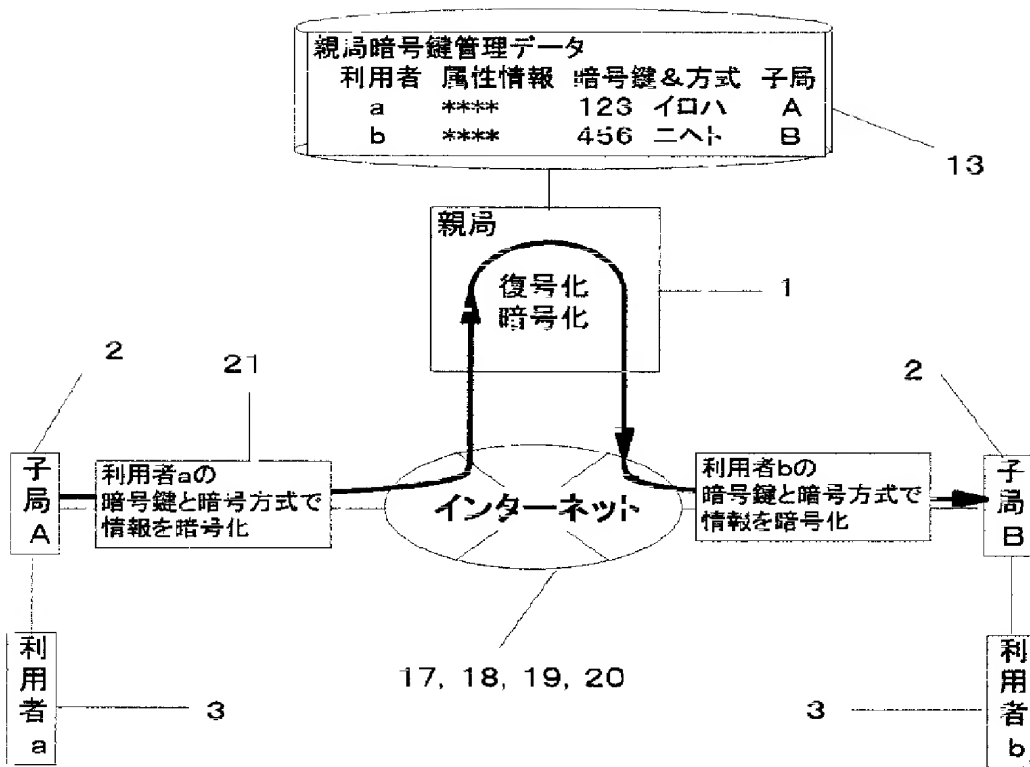
【例 14】



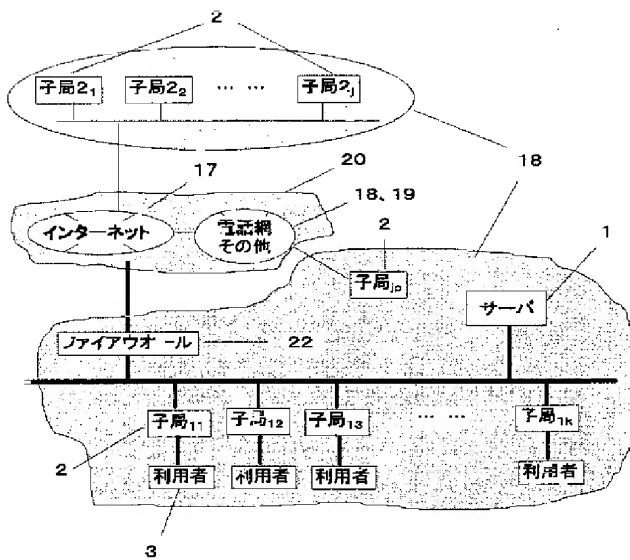
【例 16】



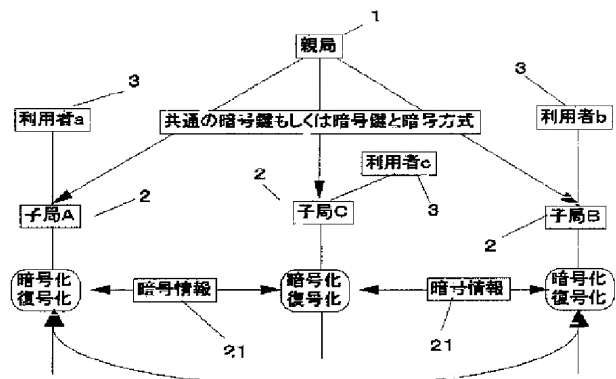
【図9】



【図17】



【図18】



【図13】

